

SERVICE REQUIREMENTS

INPUT

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SERVICE REQUIREMENTS
IN THE 1980s

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AT&T

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IN THE 1980s

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I EXECUTIVE SUMMARY

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A. PURPOSE AND METHODOLOGY

- The purpose of this study was to assist AT&T in the early phases of a major internal program designed to determine the requirements for maintenance and service in the mid-1980s.
- This particular project was aimed at obtaining a "snapshot" of the present maintenance/service policies of several vendors selected by AT&T and, through the device of on-site interviews with key vendor personnel, obtain some insight as to the likely evolution of those policies. The vendors interviewed were:
 - IBM.
 - Xerox.
 - Rolm.
 - NEC.
 - Hewlett-Packard.
 - Wang Laboratories.

- Northern Telecom.
- INPUT was unsuccessful in obtaining an interview with ITT, which was also requested by AT&T. Efforts are presently underway to obtain one more interview with either GTE, RCA, or Continental Telephone (Executive).
- The interview data from this study was supplemented with data and information drawn from INPUT's earlier multiclient study, "Maintenance Requirements for the Information Processing Industry," and from INPUT's ongoing "Field Services Planning Information Program." The former study was purchased by AT&T.
- A basic premise for the study postulated by AT&T is that the Data Processing Community has the "leading edge" in servicing software based systems, and that as communications and computation become more closely coupled in the future, the DP firms will set many de facto service standards for all vendors providing integrated communications systems. INPUT agrees with this premise.

B. GENERAL CONCLUSIONS

- The character of field service organizations in the Data Processing (DP) Industry is significantly different from those encountered in the communications industry.
 - Field service personnel are generally considered to be "professionals" and are compensated as exempt salaried personnel.
 - With one major exception (NCR Corporation), unions are not a factor in the DP industry.

- DP field service people are given wide latitude to make independent judgements about how to handle a problem in the field.
- Formal escalation procedures are generally absent. In their place are broad guidelines used internally and rarely published to the customer. There are a few notable exceptions (e.g., DEC).
- Field service people take overall direction and priority setting from marketing/sales, regardless of the formal organization reporting structure.
- DP organizations attempt (with varying degrees of success) to implement the "account control" philosophy engendered by IBM.
 - . Service is an integral part of the plan. Such things as encouraging the use of third party service firms or overt cooperation with other vendors are generally against corporate policy.
 - . This policy is in marked contrast to that found with the independent PABX suppliers and their "interconnects."
- The character of DP field organizations will change over time.
 - The shortage of trained, skilled technicians, which is becoming more acute every year, is forcing companies to hire less skilled, less competent individuals.
 - Technological advances permit new equipment designs to incorporate features that make systems simpler to maintain, as well as improving MTBF.
 - . Fewer people will be required to maintain a given equipment base.

- In many cases, relatively unskilled people will be able to handle the field service requirements.
- The advent of distributed data processing and the proliferation of small computers and terminals over broad geographic areas will force suppliers to devise new service delivery systems. Examples are central dispatch, remote diagnostics, and increased user involvement in the service process.
- The increased use of sophisticated DP and office systems by relatively unsophisticated users coupled with a shortage of skilled programmers is creating new emphasis on software. Field service organizations, traditionally oriented to repair hardware, will have to deal with complex software problems as well.
 - In situations where equipment density (geographically) is low, service personnel must be proficient in both hardware and software.
- The rapidly increasing use of telecommunications is beginning to impact field service in that people must acquire the skills to deal with this new (to them) discipline.
 - With the coming of integrated voice/data networks, field service will be forced to deal with voice-related interfaces and systems as well as the data communications functions.
- Independent PABX suppliers and "interconnects" tend to treat field service along the lines of the telephone companys' model.
 - Field technicians are not treated as professionals.
 - Formal escalation procedures are stated (but are frequently not adhered to because the independents do not have the resources to support them).

- The field service provided by independent PABX suppliers and interconnects appears to be extremely weak when contrasted with that provided by the DP industry.
 - An exception will likely be Rolm, who has decided to focus on hiring trained DP field service professionals. (It should be noted that Rolm is a company who grew up in the DP industry.)
- Independent PABX suppliers are principally concerned (today) with moving hardware at purchase price. As much responsibility for non-manufacturing functions as possible is delegated or farmed out.
 - The mode in which they operate today is characteristic of an industry in its infancy.
 - As competition from experienced DP vendors with their traditional attention to "system responsibility" begins to be felt, the independents will have to change to meet the competition.
 - Long-term survival will depend on their ability to develop an integrated marketing, software, and service capability.
- There is a growing awareness of the profit potential in service.
 - IBM, who professes to operate field service as a cost center, does in fact price service with the objective of obtaining a minimum 30% pre-tax return under established corporate guidelines.
 - In the last two years, at least 20 DP companies have switched from cost center to profit center operations. Many more are expected to do so in the future.

- In INPUT's earlier survey of 50 vendors, 46 reported pre-tax profits ranging from 8% to 22% of maintenance revenues regardless of the way in which accounting was handled.
- With the downward spiral of hardware prices, value added must come from software and service. Hardware margins will be insufficient to generate acceptable profits.
- As an outgrowth of the account control philosophy, coupled with the lack of available skilled technicians, companies are placing increased emphasis on "communication" skills and "presence" in hiring new field service people.
 - The theory is that a well-handled customer will be less sensitive to system malfunctions, whether perceived or real, and that service personnel skilled in dealing with people may well be able to cover their technical deficiencies.
- Salaries for DP field service personnel are growing at a rate of 15% per annum (and more in some areas like the West Coast).
 - In a survey of 50 firms conducted in late 1978, INPUT found the following annual salary ranges (these figures do not include IBM):

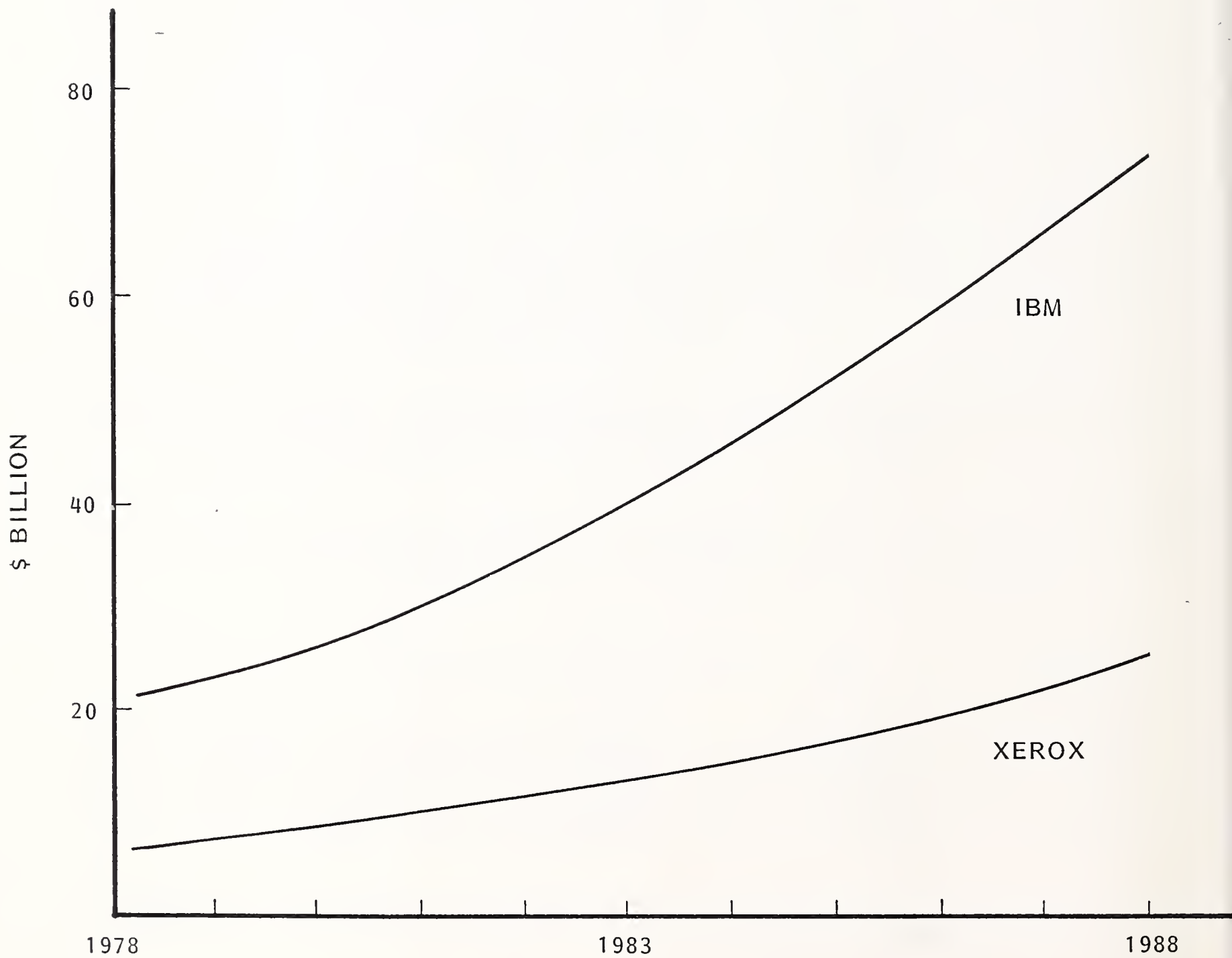
	<u>Low</u>	<u>High</u>	<u>Average</u>
Trainees	\$ 9,400	\$12,800	\$11,900
Field Engineers	13,000	19,600	15,300
Senior FEs	15,000	24,000	16,800
Specialists	15,900	31,000	24,500

- Typically, those people working with large systems were at the high end of the scale, while the earnings of those maintaining simpler devices tended towards the lower end of the scale.

- Field service salaries for independent PABX suppliers and interconnects tend to maintain parity with equivalent positions within the Bell System.
- As with nearly all other facets of the DP industry, IBM is the service leader and is the organization that should be most closely studied.
 - IBM has established de facto service standards against which all DP industry participants measure their own performance and establish their own programs and pricing structure.
 - Quality service evenly applied, has been IBM's traditional hallmark (as opposed to technological innovation).
 - In an earlier study of the IBM Series/I minicomputer, perceived service availability and quality was essentially the only reason for selecting IBM over the competition.
 - From AT&Ts' point of view, only IBM and Xerox have field service organizations of a size that can be compared to the Bell System's.
 - IBM has approximately 18,000 people engaged in field service domestically.
 - Xerox has about 25,000 people worldwide.
- The Xerox organization also deserves attention. In some ways, it can be viewed as a bridge between Telco and DP service organizations, sharing some of the characteristics of both. It is like the Telcos in that:
 - Attrition and people piracy are not problems of the same magnitude as DP companies face.
 - Equipment densities are much higher than found in DP organizations.

EXHIBIT I-1

IBM AND XEROX ANNUAL REVENUES FORECAST
(APPLYING HISTORICAL GROWTH RATES)



- For example, a Xerox copier field service person averages 85 calls a month. The corresponding figure for DP firms is 26.
- Personnel have been trained in a highly specialized way and are equipped to service only one class of equipment. Retraining on new systems or technologies will be a massive undertaking.
- Xerox field service is like the DP organization in that:
 -
 - Personnel are considered professionals. Unions are not involved (although they continue to attempt penetration).
 - Field Service is part of the marketing/sales organization.
 - Xerox tends to draw people from the same talent pool as do the DP companies.
- Under the assumption that corporate policy at both IBM and Xerox will be aimed at maintaining historical growth rates, IBM's and Xerox's revenues growth is projected in Exhibit I-1.
 - Both companies have reached near saturation levels in their traditional markets.
 - In order to maintain acceptable growth rates, both firms must then develop new markets four times the size of their current market base in just ten years.
 - Given the positioning of both companies, there is little doubt they will have to develop their new markets in the office and eventually, the home environments - AT&T's traditional purview.
 - Service and software will be the keys to competitive success.

- INPUT believes that Northern Telecom has the potential to be a major competitor in the integrated data/communications system market.
 - It has the financial resources of Bell Canada behind it plus their obvious expertise as a major common carrier.
 - It has a significant DP oriented systems capability resident in Northern Telecom Systems Company, the new group formed out of the Data 100 and Sycor acquisitions.
 - It is one of the leading independent PABX suppliers.
 - Internal communications throughout Bell Canada and all of its subsidiaries is superb for an organization of its size. It appears to INPUT that they are poised to "pull it all together."
- INPUT does not believe that competition from overseas suppliers will pose a significant threat to established domestic participants as they are presently structured.
 - They are not equipped to deal with software, applications or systems problems in the U.S.
 - They may participate (even heavily) as component, subassembly or system manufacturers. By the middle of 1980s, however, manufactured equipment will represent less than 10% of total user expenditures.
 - There is no evidence that any Japanese supplier is prepared to make the investment required to acquire or develop an effective U.S. marketing, support, and systems capability.
 - In comparison to the United States, the Japanese have virtually no software capability, even in Japan.

- The support structure in Japan is totally different from that found in the U.S. and is not transferable here.
- Nixdorf and Siemens, both German concerns, should be watched.
 - Nixdorf, through a series of U.S. acquisitions (principally Entrex), now has an established domestic presence. If the company is acquired by Volkswagen, the parent's financial strength could provide the resources needed to develop a major competitor.
 - Siemens is a \$15 billion concern who, among other things, is the largest DP and communication system vendor in Germany. The company has had considerably experience with American acquisitions and currently offers an advanced PABX system in the U.S. through interconnects.
- In the DP industry, Hewlett-Packard is generally recognized as offering the finest quality of service among those firms that specialize in small computers.
 - H-P is basically an "engineering" company run by technical people. The firm began as an instrumentation company with very strong warranty/service policies. These have been carried over to their computer operations.
 - H-P's product and marketing efforts are directed towards specific industries. There is no present evidence that suggests they will become a factor in the general purpose integrated communications systems area. However, the company has the technical and financial resources to enter the business should it choose to do so.
- The ultimate positioning of Wang and companies like it, such as MAI/Basic Four, Quantel, etc., with respect to the integrated system business is unclear.

- Wang's traditional market focus has been the provision of general purpose systems to the small and medium size customers.
- Because of margin pressure from the dozens of competitive systems available, Wang is attempting to develop the large customer market, an arena in which they have yet to demonstrate success.
- Because their focus is on selling and supporting off-the-shelf systems, Wang does not have a significant field support capability.

C. RECOMMENDATIONS

- The set of recommendations that follow are based upon the admittedly thin research accomplished to date and were formulated with very little knowledge of the plans or current status of the AT&T field service organization and its programs. It is hoped that they will serve as a basis for stimulating discussion and as a vehicle for identifying those areas needing further study and analysis.
- AT&T should be preparing now to develop a multi-discipline field service force capable of addressing the systems which will be in place in the 1980s.
 - Disciplines required include:
 - . Software
 - . Electromechanical (copiers, printers, storage devices)
 - . Electronics

- In addition to these specific technical disciplines, AT&T must have a capability for dealing with integrated systems encompassing such notions as distributed data processing, "automated office" systems, timesharing, and "electronic mail."
- AT&T should develop both the basic skills required and the product knowledge to which the basic skills must be applied across a very large population.
 - To make this an accomplished fact, AT&T will be faced with a massive investment in both retraining of existing people and recruiting of new talent.
 - . In 1978, the average cost per "student day" for training field service people in the DP industry was \$117 plus salary. By 1983, costs will double. Thus, a total cost of \$400 per student day in 1983 would appear to be a conservative figure. Assuming an average of 50 days training per new hire or retrainee, the training cost for 5,000 people would be \$100 million, which does not include development of the training programs.
- Recruiting and training should stress interpersonal skills in addition to the technical requirements. In conjunction with developing these skills among the field personnel, new management methods will have to be effected with particular focus on selecting and equipping first line field management.
 - First line managers will be faced with the task of motivating the field force and maintaining the appropriate AT&T "image."
- AT&T should experiment with new training methods. In particular, interactive, self-paced automated instructional systems seem to hold great promise as a tool that provides a good balance between learning speed and cost. Therefore, AT&T should build on its experience with self-paced systems and upgrade to full interactive instruction.

- By the mid-80s, new systems will have to be in place to support the field organization. These systems include such things as parts inventory management and distribution, diagnostic techniques (including remote diagnostics), repair facilities, documentation, fault-fix data bases (RETAIN) customer control, etc. These systems will have to be designed to fit the structure of the organization as it develops.
- The field organization will have to be structured to accommodate the various levels of proficiency and task assignments. Later in this study it is suggested that three levels of field service personnel will be needed to meet future needs. These are:
 - Local field technician (could be non-exempt).
 - Branch support generalist.
 - Central or regional site technical specialists.

Escalation procedures must be modified to fit the organization.

- As stated earlier, service represents a major profit opportunity. AT&T should capitalize on this opportunity and go as far as possible within its regulatory constraints to develop service as a product.
 - AT&T should consider functioning as a TPMO (Third Party Maintenance Organization), wherein it would assume full service responsibility for systems that interface to its systems and networks.
- Organizationally, field service should be closely coupled to marketing, with the latter having responsibility for establishing service priorities, particularly at the customer level.
- The level of reliability and maintainability designed into a particular product or system should be part of a comprehensive plan that balances customer

requirements, the nature of the competition, field maintenance skills available, and the maximizing of revenue (and profits) derived from service.

- For control and proper pricing of service, reliability must be predictable within narrow bounds.
- As the service organization is gradually restructured over the next several years, the new positions created should have a professional connotation associated with them.
 - This will place AT&T in a better position to recruit against the competition.
 - Presumably, the new positions will be non-union.
 - Career paths, both technical and managerial, will have to be provided.
- If AT&T adopts many of the recommendations presented here, service assurance will become an increasingly more important function, particularly in view of AT&T's size.
 - It will be necessary to create an ongoing service assurance program with heavy participation by senior management.
- The way in which AT&T evolves its organization and restructures its people to deal with the service requirements of the 1980s will heavily influence its competitive posture and resultant revenues and profits. INPUT believes that in-depth planning on a continuing basis will be required to adequately anticipate and understand the future implications of both policy and operational decisions. A permanent full-time planning function for field service activities should be established without delay.

D. AREAS FOR FUTURE STUDY

- In the course of the research for the study and as a result of discussions with several AT&T people, INPUT has identified several areas which are worthy of further study. These are briefly identified in the following paragraphs.

I. SERVICE AS A PRODUCT

- In the addendum to this study is a position paper which addresses the concept of service as a product. INPUT states unequivocally that (at least in the Data Processing Industry) service will be a major contributor to corporate revenues and profits.
 - AT&T should determine the revenue/profit opportunity from its own perspective.
 - If the size of the opportunity warrants further investigating, the means by which service is offered (by AT&T) as a product must be identified.
 - For example, what are the tradeoffs between T&M and fixed price contracts? Which should be offered and under what circumstances? Should maintenance contracts be bundled or unbundled - mandatory or optional?
 - As a part of the analysis, customer willingness to participate in installation, diagnosis and repair should be assessed.

2. THIRD PARTY MAINTENANCE FUNCTION

- Earlier in this report, INPUT recommended that AT&T investigate the feasibility of offering services under which the company would assume field support responsibility for "foreign" systems attached to AT&T systems or networks. There are several issues to be examined, including:

- What is the size of the revenue/profit potential (today and the years to come)?
- What level of acceptance or resistance to AT&T's implementation of this concept can be expected? From competitors? From customers?
- To what extent will regulatory agencies hinder or promote the activity vis-a-vis AT&T's participation?
- Will implementation assist AT&T in other than direct financial ways? For example, would AT&T obtain better account control?
- What is the dimension of the risk associated with entering the third party business?

3. SERVICE DISTRIBUTION

- New methods for distributing service are being introduced constantly. AT&T needs to understand the implications of each method or system upon its own operations. INPUT envisions a series of cost/benefit analyses done for each approach. Examples of the kinds of things that might be examined (in random order) are:
 - On-site stocking of spares (including sale of high mortality kits).
 - Remote diagnostics.
 - User participation in diagnosis and/or repair and/or installation.
 - System support centers.
 - Regional/branch repair centers.

- One item in the above list (User Participation) deserves special attention. This is a major issue at companies who traditionally have offered total "end-to-end" support as an underpinning of the way in which they conduct business. Encouraging user participation means a major change in policy which will have a significant impact on the way AT&T's business is conducted.
- A corollary question to be addressed is, "What does the user expect to get from his participation?"

4. ESCALATION PROCEDURES

- The necessity or relative importance of formal escalation procedures as they will impact AT&T's competitive posture needs to be better understood. Questions to be addressed include:
 - Should escalation procedures vary by type of product or customer? If so, what type of structure is most appropriate for each product/market segment?
 - What level(s) of commitment need be published?
 - How important or effective are escalation procedures as a competitive tool?
 - What are the customer's perceptions of escalation procedures? How much weight does he attach to them?

5. PERSONNEL ACQUISITION AND TRAINING

- AT&T will have to bring new skills and management into its organization to deal with future requirements. In view of the continuing acute shortage of needed talent in the United States, coupled with AT&T's need for large numbers of people, a program designed to ensure an adequate supply of the right kind of people must be implemented.

- Profiles of people that need to be brought in or retrained should be developed.
- Potential sources of people must be identified and evaluated from a long-term perspective.
- Ways to enhance AT&T's competitive recruitment posture need to be defined.
- Compensation and other motivation practices need to be reviewed and changed if they prove to be inadequate.

II INTRODUCTION

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A. PURPOSE AND METHODOLOGY

- The purpose of this study was to assist AT&T in the early phases of a major internal program designed to determine the requirements for maintenance and service in the mid-1980s.
- This particular project was aimed at obtaining a "snapshot" of the present maintenance/service policies of several vendors selected by AT&T, and, through the device of on-site interviews with key vendor personnel, obtain some insight as to the likely evolution of those policies. The vendors interviewed were:
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B. ASSUMPTIONS/MID-80s SCENARIOS

- As originally envisioned, the results of the study were to be stated in the context of several narrowly defined mid-1980s product and market scenarios, such that these results could easily be integrated into a formal set of internal AT&T planning documents.
- AT&T asked INPUT to postulate several thoughts about the climate of the 1980s which are briefly described in the balance of this section. It is hoped and intended that these thoughts serve as a point of departure for future analysis and that they will for the moment, at least, serve as a frame of reference for questions about the current research as they arise.

I. PRODUCT SPECTRUM

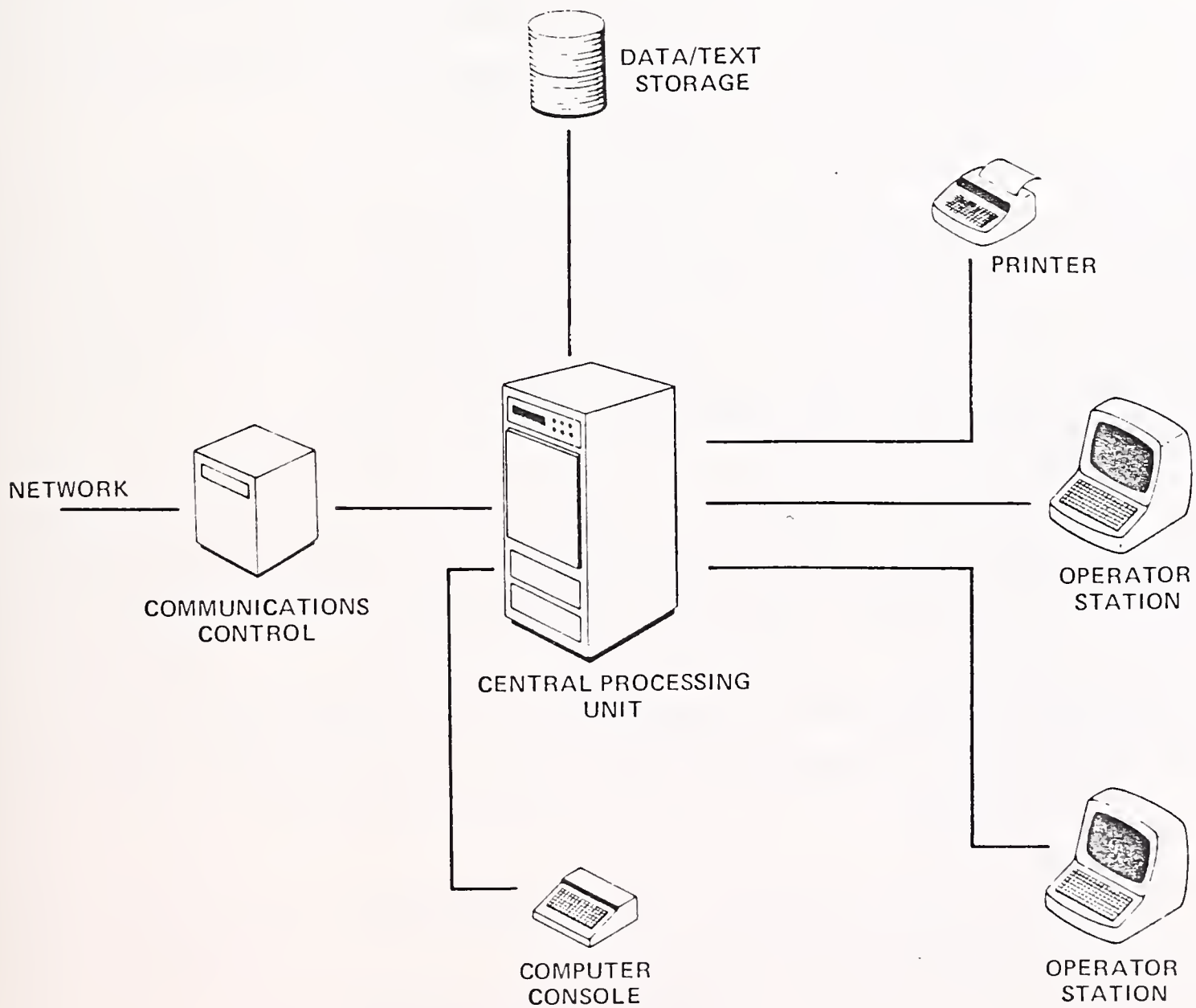
- INPUT perceives that the in-office product spectrum will develop along the lines of one or more of the systems defined in its earlier studies dealing with "Multifunction Equipment." There are six potential systems. At this writing it is too early to state with certainty which will be the ultimate survivors, but AT&T should be aware that each has a certain potential for success and that all will likely survive in some form.
-
- The theory behind the design of the selected systems is that a vendor will move from his existing product offerings toward adding other logical functions to the system. For example, a small business computer can be augmented with software and hardware to perform text editing. This increases the system versatility, the equipment market, and the vendor revenues.
-
- The expansion of system functions matches the logical market expansion pattern of a typical vendor. First the vendor sells additional equipment functions to his existing customer base; second, to additional sites in his existing customer base; and, third, to new customers.
- Expanding the functions of an existing product saves engineering costs if the initial product design provided for expansion. There can also be training cost savings for field sales and maintenance personnel.
- The multifunction approach lends itself to modular design. The building block concept of this design is a cost effective approach to an expandable system.
- The multifunction system is advantageous to vendor and end user alike and should strengthen the vendor/customer relationship.
- The six systems selected for this study are:

- System #1 - Small business computer with text processing as an added function.
 - System #2 - Text editing system with data computation as an added function.
 - System #3 - Office copier with facsimile and output printer as added functions.
 - System #4 - PABX with data or text processing as an added function.
 - System #5 - Communications network with added information processing functions.
 - System #6 - Timesharing systems with added communications functions.
- Each of these systems represents the potential entry of a class of vendors into the market.
 - It should be noted that there are no constraints on the size of any of these systems as they can be configured to deal with the needs of both small and large users. Further, any of the systems can be linked to a large host or DDP systems where required.
- a. Small Business Computer With Add-On Text Processing Functions
- This system consists of the central processing unit (CPU), storage unit, communications control unit, output printer and operator stations of a small business computer combined with the text oriented work stations and office quality printer of a text editor (Exhibit II-1).
 - This is a popular multifunction system because of the large installed base, the many small business computer vendors, and the capability of the CPU to perform additional functions.

EXHIBIT II-1

SMALL BUSINESS COMPUTER WITH ADD-ON TEXT PROCESSING

SYSTEM I PRIMARY FUNCTION: SMALL BUSINESS
 DERIVED FUNCTION: TEXT EDITING



- Multifunction systems of this type are now being sold by IBM, MAI, and Wang.
- The system is quite flexible and can perform numerous functions.
 - The computer portion of a small business system has ample capability to handle real time interrupts from sensors of heat and power, as well as time clocks and data entry devices. These real time interrupts can be serviced by the computer, including physical and security sensors, and time clocks.
 - The internal memory and external magnetic storage memory (such as the disk of a computer) provides ideal storage for the correspondence of a small business computer text processing system. As electronic memory becomes less expensive than paper storage (including access cost), text storage will become a prime function.
 - Automatic letter and invoice writing can be considered a "limited function" type of text editing. However, it is very important to many business sectors such as insurance and wholesale distribution. This function implies a high speed and high quality output printer such as "daisy wheel" or ink jet.
 - As a text editing unit by utilizing the CPU to perform the sentence and paragraph analysis and the office quality printer to output the letters and memos. Note that the memory and logic capability of the computer can result in a superior text editing unit. This function was mentioned by many respondents from INPUT's surveys and is a key added function for small business computer-based multifunction systems.
 - As a private electronic mail terminal using the communications control, memory storage, and output printer.

- Voice communications can be monitored and controlled by the CPU of the small business system. This can result in cost control by billing communications cost to the appropriate department. Cost reduction is achieved by optimum routing of calls among WATS, leased line, and direct dial communications services. The implementation of these functions requires an interface with the PABX communications system.

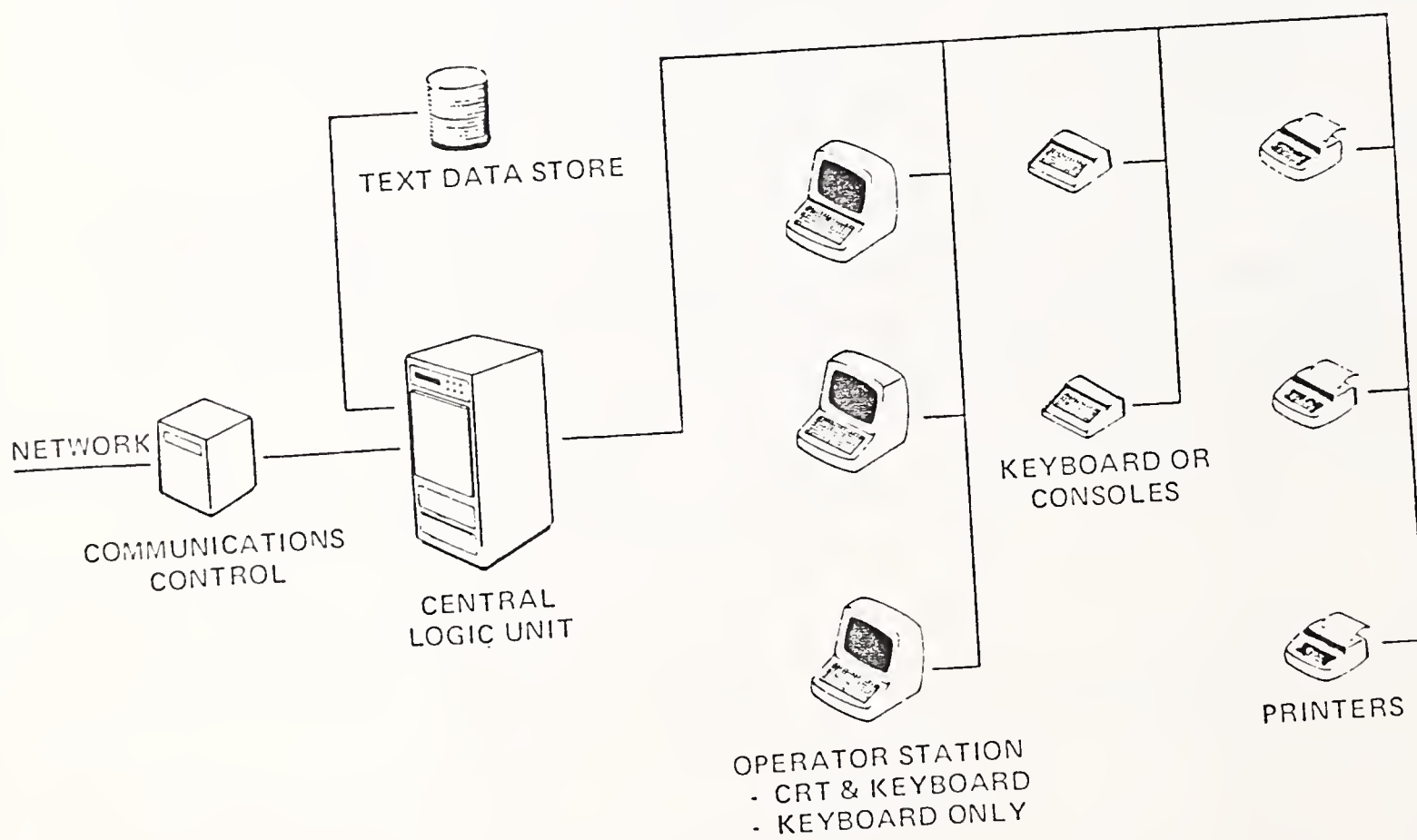
b. Text Editing System With Add-On Computation (Small Business Functions)

- The text editing system (Exhibit II-2) is quite similar to the small business computer system (Exhibit II-1) in its block diagram and implementation. There is little difference between the two systems in their functional diagrams when considering numbers and text only as information to be processed.
- However, the text editing system has high quality printers and CRT displays which handle both upper and lower case alphanumerics and displays a reasonable portion of a page of text. Along with text processing this system can perform data processing functions such as:
 - Computation and data storage which require arithmetic logic, application programs, and high level language programming aids.
 - Data and file storage can be accomplished by the text storage portion of a text editing system. The functions are similar.
 - The inclusion of a communications control unit in an "intelligent" text processing system allows it to interface with communications networks and perform the functions of:
 - Data terminals.
 - Electronic mail terminals.

EXHIBIT II-2

TEXT EDITING SYSTEM WITH ADD-ON COMPUTATION FUNCTIONS

SYSTEM II PRIMARY FUNCTION: TEXT EDITING/WORD PROCESSING
DERIVED FUNCTION: DATA PROCESSING-TERMINALS



- Message control.

- The high quality displays, keyboards and output printers of a text processing system make it an ideal electronic mail terminal.

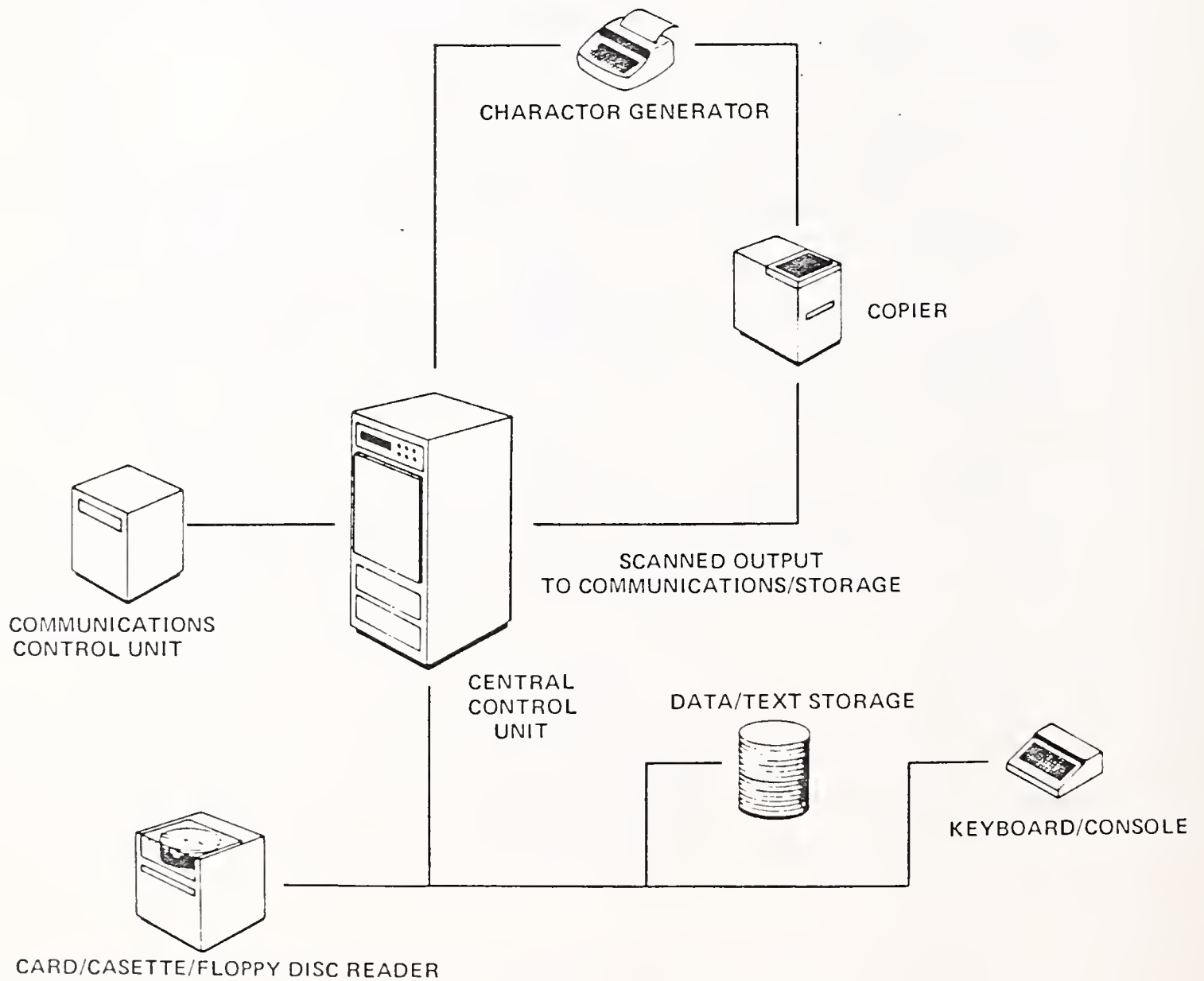
c. Copier System With Add-On Facsimile And Output Printer
Functions

- A sophisticated copier already performs the complex functions of image transfer, paper control, and movement. In many cases these are the most difficult and expensive functions to implement.
- If an electronic character or graphics generator is added to the system (such as a laser to mark images) then additional functions can be performed.
- Because copiers are used in every office and are supplied by major vendors such as 3M, IBM, Kodak and Xerox, they are an important entry point into multifunction systems.
- Few copier-based multifunction systems have reached the market as yet. IBM recently announced its 6670 document distributor system and a number of other major vendors are logical entrants to the market.
- The copier-based system (Exhibit II-3) includes the copier itself plus an electronic character generator and central control unit which converts the copier into an output device. Once the output device exists, ancillary logic determines the specific function to be performed. These functions include:
 - Facsimile - when the optical scanner of the copier provides the system input and the character generator plus the copier provide the system output.
 - The memory and character generator allow the device to be a high speed output printer for a computer or text processing system.

EXHIBIT II-3

COPIER SYSTEM WITH ADD-ON FACSIMILE AND OUTPUT PRINTER FUNCTIONS

SYSTEM III PRIMARY FUNCTION: COPIER
DERIVED FUNCTION: FAX COPIER TO FAX



Average copiers can operate at a speed of one page per second, or 50 lps, or 3,000 lpm, providing very fast printer output.

- An electronic mail terminal exists when a communications control unit is added to the system. This can include graphics as well as text, an important feature for electronic mail.
- Text justification and photocomposition can be performed by the system, as they both involve the ability to change graphics electronically.

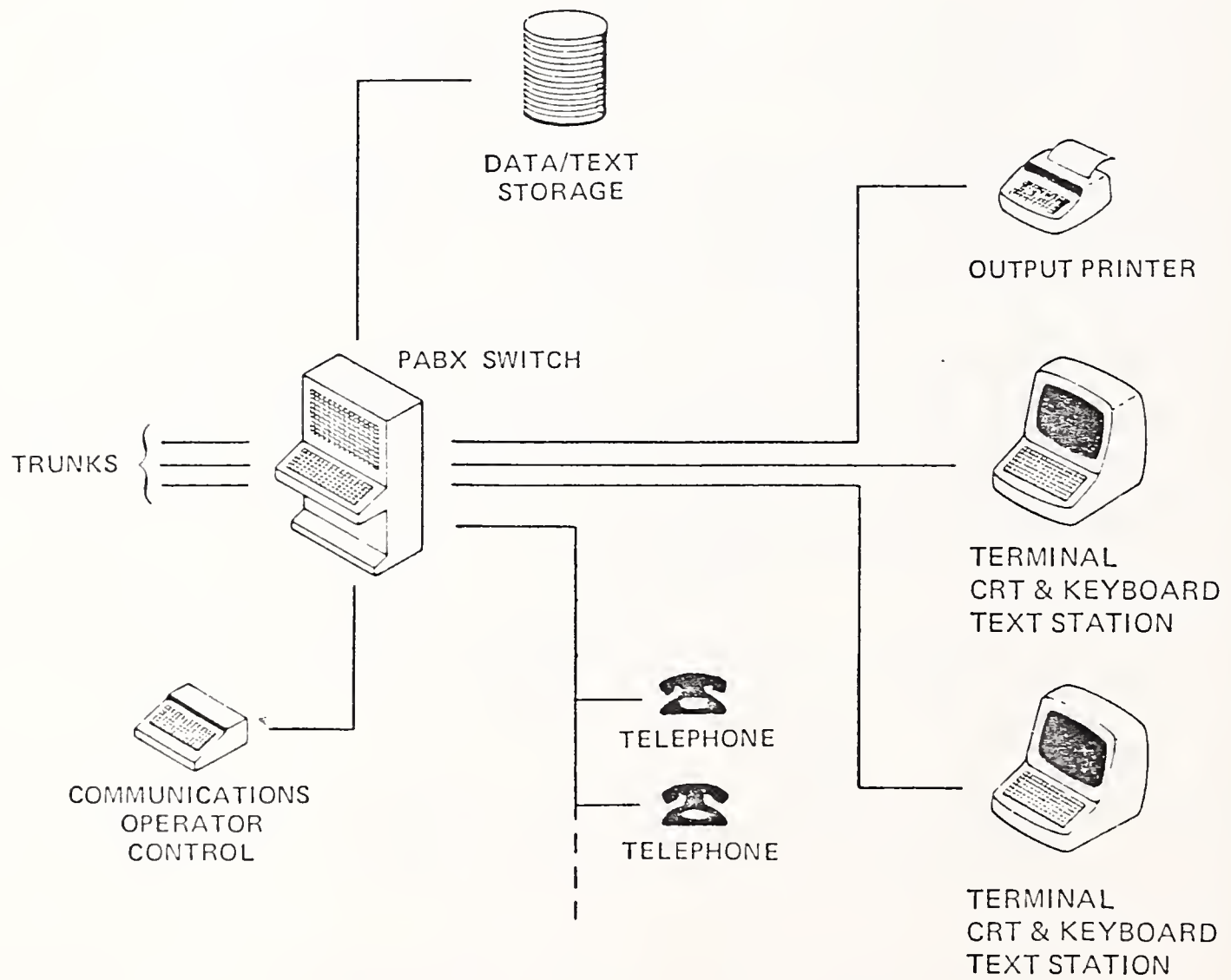
d. PABX System With Added Data Or Text Processing Functions

- The modern PABX uses a computer to control communications functions. The computer can also be used for data or text processing. A block diagram of a PABX system is presented in Exhibit II-4.
- Advanced digital PABX systems are available from major communication vendors such as AT&T, GTE, and Northern Telecom. These provide access to a variety of business, communication and information processing services, as well as standard telephone services.
- Using the computer to perform information processing operations, the PABX can also perform the functions of:
 - Communications control which includes automatic billing of communications services used, and least cost routing.
 - Data processing which uses the PABX computer as the central data processing unit, and adds terminals for input/output.
 - Text processing which is similar to a data processing system with a high quality output printer.

EXHIBIT II-4

PABX SYSTEM WITH ADD-ON DATA OR
TEXT PROCESSING FUNCTIONS

SYSTEM IV PRIMARY FUNCTION: PABX
DERIVED FUNCTION: TEXT OR DATA PROCESSING



- Specialized display terminals and electronic mail operations.

e. Communications Network System With Added Information Processing Functions

- In the communication network class of systems (Exhibit II-5), the central processing unit used to operate the network is also used for processing information. At the present time there are many legal and regulatory restrictions which prohibit the full use of a comprehensive communication network system. However, INPUT's studies showed that the user's receptivity to such a system, if the regulatory issues are resolved, is very high.

- Intelligent network services such as packet switching use computers to store, format and move information. A multifunction system based upon a communications network would take a further step and operate upon the information. The system would perform the functions of:

- Timesharing data analysis.
- Remote text editing and processing.
- Computerized intra-company message system.
- Data base distribution by the network and data base access control. The data base can be owned by either the communications vendor, the user, or a third party.

f. Timesharing System With Added Communications Function

- Timesharing systems performing communications network services are similar to communications network systems performing remote computing services, shown in Exhibit II-5. The only difference is the vendor, a commercial timesharing company rather than a communications common carrier.

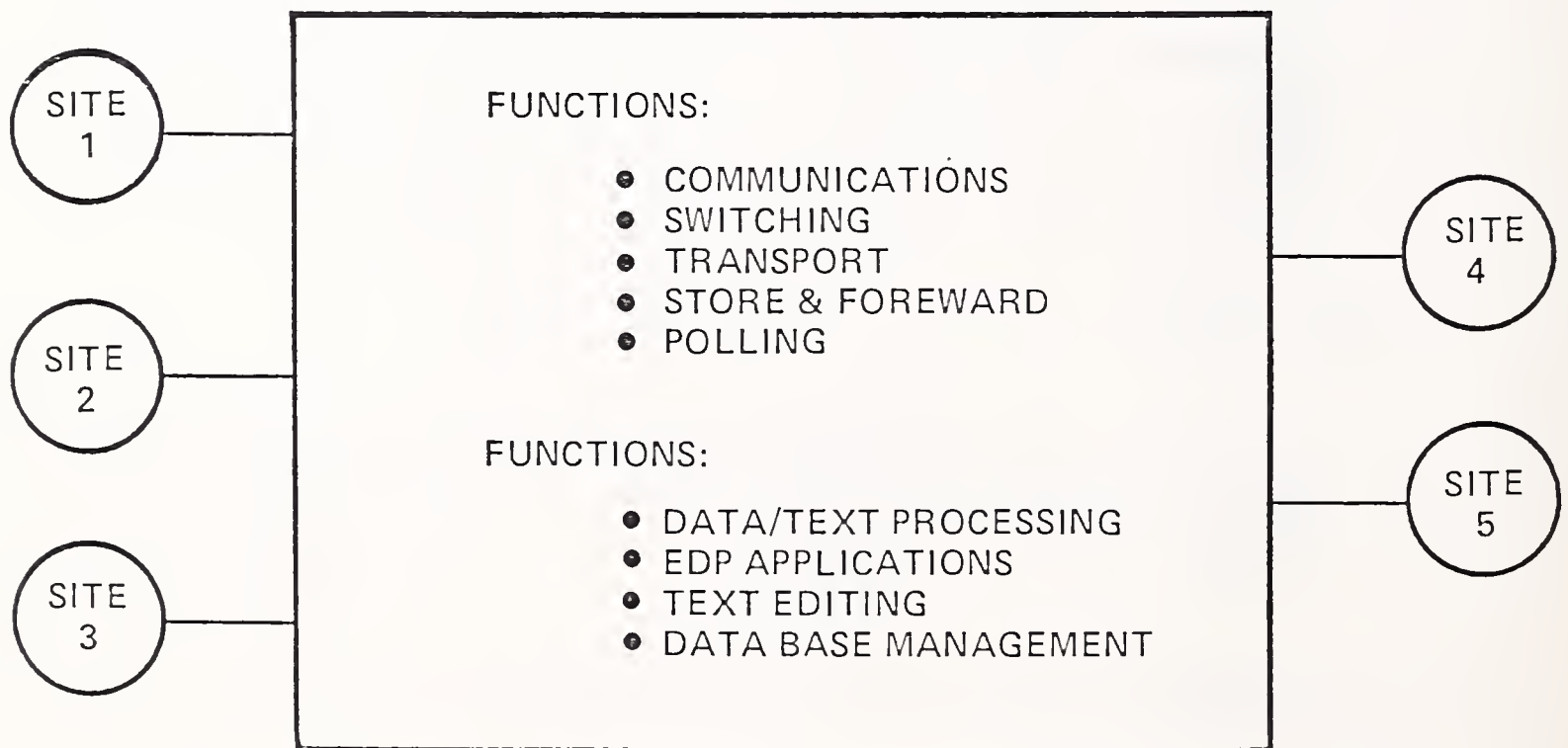
EXHIBIT II-5

COMMUNICATION NETWORK SYSTEM PLUS INFORMATION PROCESSING
OR
TIMESHARING SYSTEM PLUS COMMUNICATIONS FUNCTIONS

SYSTEM V PRIMARY FUNCTION:
 DERIVED FUNCTION:

- COMMUNICATIONS
- INFORMATION PROCESSING & STORAGE
- TEXT PROCESSING
- DATA PROCESSING
- INFORMATION STORAGE

NETWORK CARRIER/SUPPLIER



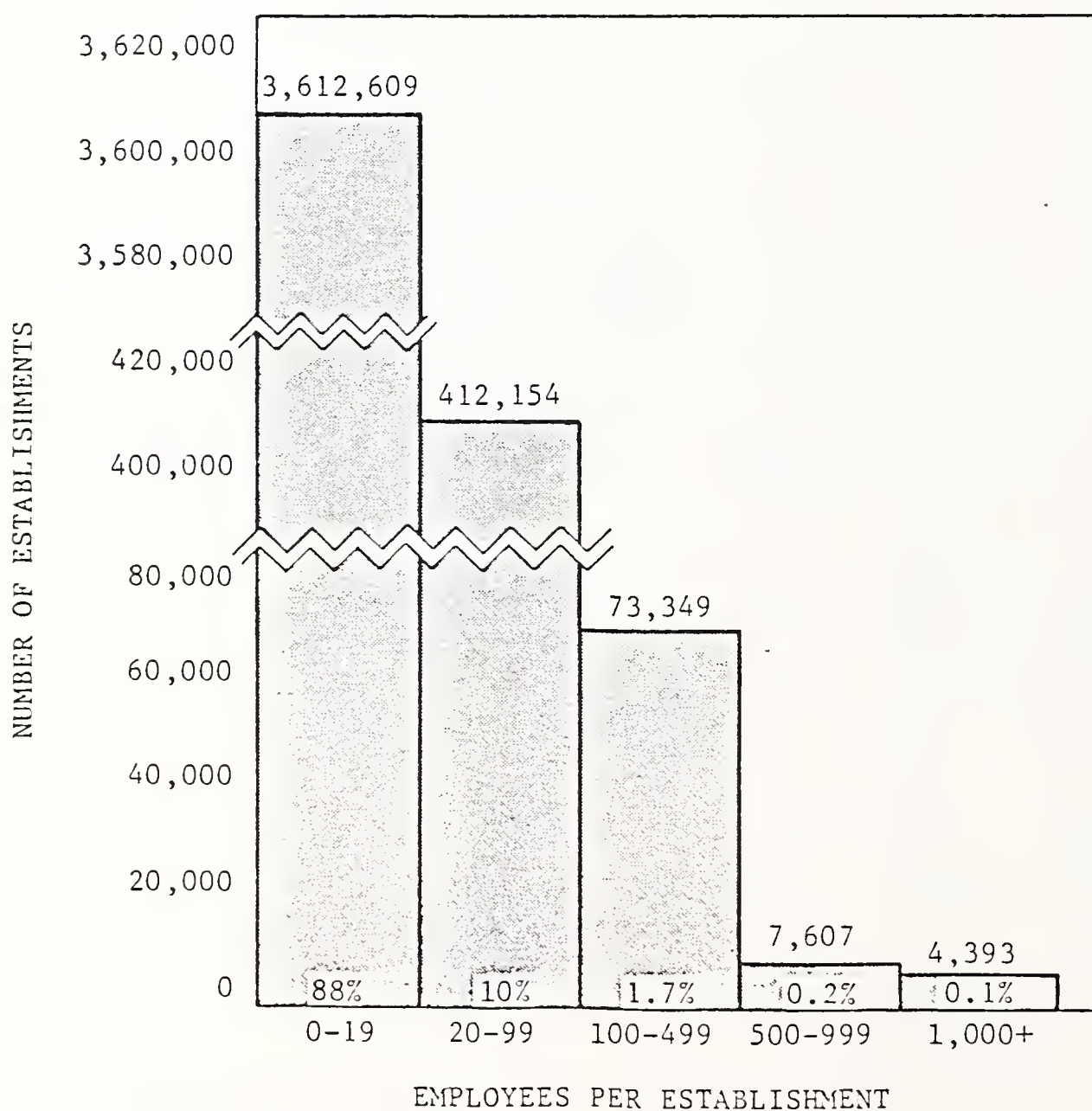
- The same regulatory agencies that prevent communications companies from selling computer services prevent timesharing companies from selling communications services. INPUT's study only addressed the question of the users' interest in this type of multifunction system regardless of regulatory constraints.
- The functions which could be provided through the timesharing facilities are:
 - Electronic mail and message services, including:
 - Information distribution.
 - On-line or off-line message preparation.
 - Message retrieval on demand.
 - Long-term storage and delayed message delivery at user terminals.
 - Communications services including:
 - Packet switching.
 - Store and forward switching.
 - Compatibility of equipment and protocols.

2. CUSTOMER MARKET SIZE

- For the purpose of this analysis, INPUT has structured the market into five categories, by employees size as shown in Exhibit II-6. There are, of course, many other criteria that could be applied.

EXHIBIT II-6

NUMBER OF ESTABLISHMENTS BY SIZE IN THE UNITED STATES (1972)



TOTAL NUMBER OF ESTABLISHMENTS
IN U.S.: 4,110,112

3. COMPETITIVE ENVIRONMENT

- INPUT was asked to postulate lists of, at most five, companies (excluding AT&T) who would likely be dominant competitors in each market size class in the mid-1980s in regard to the provision of integrated office/DP/communications systems. These lists are:

1-19 employee sector

IBM
Xerox
EXXON

20-99 employee sector

IBM
Xerox
MAI
Wang

100-499

IBM
Xerox
Northern Telecom
MAI

500-999

IBM
Xerox
DEC
Northern Telecom
Burroughs

1000+ employee sector

IBM
Honeywell
Burroughs

4. DISTRIBUTED DATA PROCESSING (DDP)

- By the mid-1980s, DDP will be approaching a level of maturity within the information processing marketplace. This level of user acceptance will cause it to influence the "office of the future" systems.
 - By 1982, the data processing hardware market will have increased from \$10 billion in 1977 to \$20 billion. Of this \$20 billion market, 30% will be associated with DDP related systems.
 - The banking, process, and discrete manufacturing industry segments will continue to lead the way in adopting DDP techniques.
- Implied in the expansion of DDP will be increased use of data communications by companies adopting this type of implementation.
 - This will result in a user base that will be more knowledgeable in data communications and more receptive to "office of the future" system implementations.
 - It will be possible for "office of the future" systems to couple onto inter-company communication networks.

5. ROLE OF LARGE HOST VERSUS "SMALL" COMPUTERS

- By the mid-1980s, large host computers will be relegated to the following classes of activity in leading edge firms.
 - Scientific processing requiring extended word length arithmetic, generally operating in a standalone (as opposed to a teleprocessing) environment.
 - Management of large DDP networks.

- Management of information storage and retrieval functions in DDP or very large centralized environments.
- Data consolidation and centralized reporting.
- Nearly all other required functions will be handled by physically small machines offering power equivalent up to that of today's so-called mid-range systems.
- In large corporations, devices dedicated to use by a single executive or professional will become commonplace. These devices may or may not be linked by communications, depending on the applications requirement.

6. COMMUNICATIONS/NETWORK AVAILABILITY AND COST

- Low cost network communications will be available in the mid-1980s.
- These networks will offer both inter-company and intra-company communications networks.
- The FCC and international regulatory bodies will increasingly accede to pressures from both the vendor and user communities.

7. FOREIGN COMPETITION

- Foreign competition will not be of major significance at the systems level, i.e., these companies will not be a major force in the direct sale of systems to U.S. firms.
- However, it is expected that possible associations could be expanded or established with U.S. firms as manufacturing sources for components and subsystems.

8. CHANGE FROM HARDWARE TO SOFTWARE

- By the mid-1980s, the software characteristics of "office of the future" systems will be the differentiating factors in the marketplace.
 - There will be no significant differences among the hardware offered by the major competitors in the marketplace.
 - The software capabilities of the system will permit the competitors to tailor their system offerings to unique and individual requirements of the users rather than forcing the users to modify their requirements to meet (the more) rigid hardware constraints.
- Successful vendors will exploit their software capabilities, but this will redirect the focus away from the traditional hardware performance comparison sales orientation toward a service orientation grounded on a thorough understanding of individual company user requirements.

III STUDY RESULTS / ANALYSIS

III STUDY RESULTS/ANALYSIS

- o The results reported in this section primarily reflect conditions and field service operations from the perspective of the Data Processing Industry as a whole. IBM is singled out for special attention because of its commanding lead in the marketplace and because it established many de facto standards against which other industry participants attempt to emulate.

A. GENERAL ISSUES

- The following general issues must be considered in developing a viable services policy for the mid 1980s. Each of the issues discussed below should be considered by AT&T in establishing their strategic posture for this time frame.

I. ORGANIZATION STRUCTURE FOR DATA PROCESSING INDUSTRY

- The field service organization will continue to exist as a major organizational element within these companies.
 - It will usually be headed by a Vice President with direct reporting to the general management level of the company.

- There will be a cooperative non-adversary relationship with the marketing/sales organization within the company with some geographic co-location.
- The overall structure of the field service organization will be geographic with a typical pyramid structure.
 - It will be established as a series of regions that will have a number of district offices reporting to them.
 - The regional offices will in turn report directly into the headquarters organization.
 - Regional offices may also perform the depot function for parts supply and some repair activities.
 - Located at the region for larger firms and at the headquarters for smaller firms will be a staff organization which will be responsible for such functions as parts supply, training, manual preparation, and service planning.
 - This type of structure can be found at most of the leading DP/office product companies such as IBM, Xerox, H-P, and Wang.

2. INTEGRATION OF SOFTWARE MAINTENANCE

- The performance of software maintenance will become a more centralized function within field service organizations.
 - The first level service person will continue to be a hardware oriented individual with some basic skills in software maintenance.

- However, these software maintenance skills will not permit him to correct software "faults" with only first level skills and it is expected that he will play the role of a diagnostician.
- The vast majority of the software maintenance will be accomplished by software specialists, either located at regional or headquarters support centers.
- These regional centers will be linked to the customer site via voice communication with the first level service person or directly into the system via data communications.
- The purpose of these communication links will be to diagnose the fault and issue the necessary corrections to the software. In the event that the "fault" cannot be corrected by this mode and the problem is of a high level of severity, a staff specialist will be sent directly to the customer location to correct the problem.
- The regional or headquarters based support centers will also serve in an on-going consulting role to their customers via telephone inquiry. This will be a direct link with no interface required with the first line service personnel.
- IBM is the first major company to implement the support center concept, although a few smaller firms such as BTI have used it for a long time.

3. FUTURE SKILL LEVEL REQUIREMENTS

- Future skill level requirements will have a somewhat different orientation than that found in the industry today.
- Communications and human interface skills will receive more attention both as part of initial training and on-going training. Service personnel will be required to participate in various non-technical courses to develop these skills.

Both Xerox and IBM stress these skills in their recruiting and give them higher weight than technical proficiency.

- These skills will be necessary because of the image that the company wants to create in direct exposure to their customers.
- The skills will be of paramount importance when "critical" service problems develop at a customer location.
-
- Technical skills will cover a wide range of expertise.
 - First level service personnel will require more analytical skills in the diagnosis of problems.
 - There will be almost no component-level repair conducted at customer locations with the service orientation directed toward replacement of faulty units. In some cases, complete devices will be substituted as the most cost effective solution.
 - These first level personnel will have a minimum of one year of basic technical training beyond the high school level and will usually be the product of some specialized technical school. It is also expected that some will come from a two year junior college program which specializes in electronics training.
 - At regional support levels there will be a requirement for a significantly high level of service skills that will be oriented toward specific technologies. These personnel will be college level personnel with detailed product training.

4. SALARY LEVELS FOR FIELD SERVICE PERSONNEL

- Salary levels today for in-field non-management service personnel in the DP industry range from an average low of approximately \$12,000 per year to an

average high of \$35,000. These are INPUT's findings from the 1978 Maintenance Requirements study adjusted for 1979 inflation.

- Salary increases will exceed the inflation rate of the next three to five years (because of the demand for people).
- In the computer industry, most companies will maintain the salary levels needed to keep people classified as "exempt" employees as a deterrent to unions, and to improve their competitive recruiting posture.
- The highest paid personnel service large systems. Office system repairmen, such as those who fix copiers or word processors, tend to be on the lower end of the scale.
- Competition is the major salary determinant. For example, Xerox copier field service people who have virtually no place to apply their skills should they leave Xerox are paid at or near the bottom of the current wage scale. A competent systems person, on the other hand, whose skills are transferable to nearly any firm in the business, tends to get paid near the top of the scale.
- Specialists with either hardware or software expertise are generally paid salaries equivalent to those people with equivalent experience in departments other than field service, such as programming, engineering, or R&D.

5. FUTURE SERVICE TRAINING REQUIREMENTS

- Training will continue to be an important element in maintaining an effective field service organization.
- From its survey of 50 DP vendors, INPUT found that initial training will require a period of ten to fifteen weeks for field service personnel. This training may be interspersed with periods of field assignments to provide some balance to this initial training period.

- As indicated previously, a significant part of this training will be directed toward communications and human interface skills. These skills will be developed through simulation of various real customer situations as well as basic training in communications development. This will be supplemented with actual field experience under the guidance of regional level personnel.
- Actual technical training will utilize more advanced self-paced techniques as opposed to standard classroom learning situations. Although this will require additional initial training development costs, it will be possible to tailor the training program to the individual skills with resultant cost savings. IBM has been extremely successful with its interactive self-paced training systems.
- After the initial training period, it is expected that there will be an on-going requirement for field personnel to spend about 10% of their time in various training activities.
- The majority of this training will be accomplished directly at the field locations with various self-paced and audio visual techniques, particularly video tapes.
- Major new product offerings may require the recycling of field personnel through the headquarters to develop the necessary new skills.

6. THE REQUIREMENT FOR TECHNICAL SPECIALISTS

- During the mid-1980s, the requirement will emerge for a number of high level technical specialists within the field service organization.
- This requirement will be generated by the increased complexity of the equipment to be serviced and the reduced skill levels of the first level field personnel.
- The main purpose for these technical specialists will be for dealing with problems beyond the capabilities of the first level field personnel.

- These personnel will be located in some instances, at regional support centers, but will normally be located only at headquarters based central support centers.
- Each individual will be highly specialized within a technology area, dealing with specific product related subsets of hardware, software (either systems or applications) or data communications.
- Their normal interface will be with field level personnel, via both voice and data communications, to assist and provide guidance in the resolution of complex maintenance issues. In some cases these individuals may be used in training roles within the headquarters.
- The existence of these people within the field organization will offer certain economies since they will be able to deal with major technology problems on a regional or national basis and will reduce the skill and training requirements of the field force.
- In addition to the support they will provide to the field organization, they will also provide a significant interface with engineers and product planners during the development cycle of new products. The function performed in the interface is one of assuring that the requirements for field servicing are adequately reflected in the new product developments.
- These positions will be non-supervisory and provide a promotional ladder for other highly technical personnel who show no interest in management responsibility.

7. THIRD PARTY MAINTENANCE ORGANIZATIONS

- Third party maintenance organizations will continue to operate as an important part of the industry. Their continued existence will be the result of one or more of the following factors:

- IBM will continue to have an "implicit" reliance on these organizations for the support of "obsolete" equipment and systems.
- Since IBM will no longer be interested in customer control in these situations, this maintenance will be accomplished by the third party organizations.
- With the wider use of systems over larger geographic areas there will be an emerging role for these third party organizations to service more remote geographic areas.
- While it may not be economical for larger organizations to maintain a field force in these remote areas because of the lack of density of the hardware, small regionally oriented third party organizations will seek these types of accounts.
- There will continue to exist large system installations which are composed of hardware supplied by multiple vendors.
- In those types of installations, where multiple vendors may have service agreements with the customer, it will be possible for the third party organization to offer a single omnibus contract for the maintenance of all hardware and software which will be less expensive than the multiple agreements with individual vendors.
- Reactions of the people interviewed to the third party were mixed:
 - Opposed H-P, NEC, Rolm
 - In Favor Northern Telecom
 - In Favor for Special Situations Xerox, Wang
 - No Comment IBM

8. PREDICTABLE VERSUS ULTIMATE RELIABILITY

- In the development of new systems to be introduced into the market, attention will be paid to the level of reliability that is designed into the equipment.
- These reliability levels will be limited to those which can be accurately predicted, rather than the ultimate levels that the technology may be capable of achieving.
-
- Achievement of ultimate levels could very well price the equipment above that offered by the competition.
- Designing equipment with predictable levels of reliability, within the bounds of competition pricing, will permit vendors to accurately plan the level and types of field service and attendant work force that will be required.
- Allied to this concept of predictable levels of reliability is the desire on the part of vendors to use service as a profit generator in this time frame.
- Since the expected reliability levels of systems during this time frame will be very high, the types of service requirements can be readily planned for by the vendors.
-
- No vendor would state their policies concerning this issue, but INPUT believes that all major suppliers pay a great deal of attention to it. Reliability predictions figure very heavily in field service planning.

9. ROLE OF LABOR UNIONS IN FIELD SERVICE ORGANIZATIONS

- Led by IBM, the computer industry as a whole has been successful in thwarting union penetration.
- This "phenomenon" is common in fast-paced technology-driven industries.

- . There is a high percentage of highly trained independent thinkers in these companies to whom the very concept of unionism is anathema.
 - . People up and down the line tend to be treated as professionals.
 - . There is a high degree of "team spirit" present in such companies.
 - . There is a high proportion of relatively youthful employees who are not (relatively) security conscious.
- The only major DP company who has a union for field service people is NCR Corporation.
 - Interestingly, NCR has the worst reputation in the industry for service.
 - NCR's unions are a holdover from the old cash register manufacturing days.
 - None of the firms interviewed by INPUT for this study or other projects has a deep-seated fear of union encroachment.
 - All management is aware of the potential threat.
 - Most companies mimic IBM's policies, insofar as feasible within their own economic constraints.
 - The union movement in the U.S. appears to be weakening, at least as a percentage of the labor force it represents. This tends to support management's views of their position toward union acceptance.

10. PABX SUPPLIERS AND THEIR INTERCONNECTS

- All independent (from carriers) PABX suppliers sell their systems through independent representative distributor organizations known colloquially as "interconnects."
 - The interconnect is the end user interface, providing sales, service, training, and usually financing.
 - The supplier provides training, support, and spares to the interconnect.
- Interconnects have traditionally been independent businessmen often "franchised" to handle a particular line in an exclusive but limited geographic territory.
 - There are literally hundreds, perhaps thousands, of interconnects.
- The interconnect concept grew up because the suppliers did not have the needed marketing and field support resources. In addition, some suppliers needed a third party to handle the financing on leased and rented units.
- All PABX suppliers have reported severe problems with a high percentage of their interconnects.
 - Sales activity may be too low.
 - Support is spotty.
 - Field feedback is not forthcoming.
- As a result, some of the suppliers (e.g., Rolm) have begun to buy out their interconnects or to establish their own direct sales and support offices.

- INPUT believes this trend will continue and that ultimately, all successful PABX suppliers will run and manage their own field sales and support organizations.
- As prices drop, suppliers will not be able to obtain adequate margins if they have to share markup with third parties.

II. VENDOR EVALUATION OF SERVICES (SERVICE ASSURANCE)

- All vendors conduct periodic audits of their service offerings. These audits are done to provide the vendor's management with an assessment of how well services are being provided and to determine if new service opportunities exist that are not now provided.
- Service auditing usually takes three forms:
 - Analysis of down time and repair statistics derived from field reports submitted by field service.
 - Monitoring of the frequency of "bitch lists" usually input by marketing.
 - Independent reviews of customer satisfaction conducted by a management task force under special assignment and/or an audit taken by an independent outside consulting organization.
- The latter activities are usually confined to large accounts whose loss could have a significant effect on a vendor.
- The incidence of service audits is expected to increase in direct ratio to competitive pressures.
- Audit methods, while quite sophisticated in the big organizations such as IBM and Xerox, are primitive in most smaller companies. With growth, these firms can be expected to catch up to their bigger contemporaries.

12. ESCALATION PROCEDURES

- The concept of "escalation" as applied at AT&T is virtually a foreign word in the data processing community.
 - There are some exceptions to this statement (e.g.,DEC, IBM).
 - The phrase is common to companies who have grown up in the telco business.
- Outside of IBM, only a few DP companies have formally stated escalation procedures.
 - Even IBM's procedure of "two hours to respond, two hours to repair" is actually a broad policy. Strict adherence is not demanded and considerable latitude for independent decision making is given to the person in the field.
- The attitude of most managers in DP firms is one of "when the competition forces us to implement such a formal procedure, we will do it."
- The need for, and future requirements of, an escalation procedure(s) is a function of market sector, and function within market. It is an extremely complex issue deserving of in-depth study in and of itself.

13. SERVICE AS A PRODUCT

- As discussed in the position paper addended to this report, there is a growing trend towards viewing service as a product because of its potential as a significant contributor to corporate revenues and profits.
 - INPUT's intelligence is that IBM derives a 30% pre-tax margin on service revenues as sold or allocated.

- INPUT's study of 50 other DP vendors showed profits ranging from 7-20% of revenues at 46 out of the 50 vendors. (There is no way to correlate these numbers directly because each company handles allocations in a unique way).
- As hardware costs decline, the ratio of maintenance and service costs to hardware costs is increasing at a rapid pace. For example, the maintenance bill over a 5-7 year period is likely to equal that of the purchase price of the device being maintained. Thus, revenues from service over time may exceed those derived from equipment sales.
- Many DP vendors are learning that a sizable percentage of their customers are willing to pay for spare parts stocked on-site. In some cases, terminals for example, customers are frequently willing to purchase whole units as spares.

14. DISTRIBUTION SYSTEMS

- Most DP vendors have either adopted, experimenting with, or planning new maintenance distribution systems. Some of the most frequently mentioned techniques are:
 - Central dispatch.
 - Remote diagnostics.
 - Shift to board/unit level replacement.
 - "Talk-down" procedures.
 - Central/regional repair depots.
 - System support centers.
 - On-site stocking of spares.
 - Fault isolation on a pre-determined basis.
 - Customer operated diagnostics/PM procedures.
 - Customers performing board swap.
 - "Fault-fix" data bases, some operating on-line.

- The PABX suppliers (NEC, Rolm, Northern Telecom), in contrast to the DP firms interviewed, perceived little change in the way maintenance is presently provided.
- Increasing attention is being given to increased customer participation in diagnosis, repair, and installation.
 - INPUT's earlier study of maintenance requirements showed that a significant percentage of DP users indicated that they already participated in maintenance or would consider doing so (see Exhibit III-1).
 - If IBM's experiments with user installed equipment is successful, a sizable portion of the customer base will be educated to accept the concept.

B. ANALYSIS OF IBM

I. ORGANIZATION

- The U.S. is organized primarily according to product grouping. Within each product group, the structure is geographic.
- Within the DPMG, the Field Engineering Division has 14 regions, each containing 10 to 15 branches. The branch is the basic element of the structure.
- There is a support structure provided at the Field Engineering Division level which includes repair centers, parts support and training. Software support is not provided by the Field Engineering Division, but rather by an entirely separate support group.

EXHIBIT III-1

RESPONDENT USERS ACTUALLY OR POTENTIALLY PERFORMING MAINTENANCE TASKS, BY COMPANY SIZE

TASK	PRESENTLY PERFORMING				WOULD CONSIDER PERFORMING				TOTAL	PERCENTAGE PRESENTLY OR POTENTIALLY PERFORMING				PERCENT
	VL	L	M	S	VL	L	M	S		VL	L	M	S	
INSTALLING EQUIPMENT	7	4	3	5	11	10	8	11	40	18	14	11	16	59
RUNNING DIAGNOSTICS	8	8	9	10	23	22	20	28	93	31	30	29	38	128
PERFORMING MAINTENANCE	2	1	4	7	4	5	8	12	29	6	6	12	16	40
DELIVERING FAULTY EQUIPMENT FOR REPAIR	3	2	2	1	10	8	3	10	31	13	10	5	11	39

VERY LARGE=VL
LARGE=L
MEDIUM=M
SMALL=S

NUMBER OF RESPONDENTS-109

- The typical branch office will house field engineering, sales and program support, as well as some technical product specialists and supertechnicians.
 - In the field organization at the branch level, there are several levels of field engineers and territorial and account supervisors who have line responsibility, all under the authority of the Field Engineering Manager.
 - The Field Engineering Manager has a dotted line relationship to the Branch Sales Manager, who for all practical purposes has overall responsibility for the geographic area.
- There is budget and performance goal responsibility established for each branch with branch field engineering directly accountable for success.
- The branch is actively supervised and audited by the appropriate region. Customer satisfaction and performance are verified by responsible regional personnel.
- Software problems are referred to the branch program support representatives, who act as liaison with the SCD responsible for software development.
- Since the existing structure has been extremely successful, it is not expected that there will be any significant changes in the future.

2. FIELD ENGINEERING SALARY RANGES

- Salary levels for field engineers are very broad and personnel are classified into many categories for salary administration purposes.
 - Branch field engineering managers will earn \$40-50K annually.
 - Entry level field engineers will earn \$20K.

- In between these two extremes there is considerable variability in salary. It is expected that specialized support personnel and super technicians are compensated at similar levels to design engineers with salaries into the mid-\$30K range.
- Field engineering personnel with supervisory responsibility will normally receive about 20-25% more than the level being supervised.

3. BACK-UP/SUPPORT SYSTEMS

- IBM provides an extensive back-up/support structure for its field organization.
- The support structure is basically designed to accommodate the philosophy that the field engineer is expected to solve the problem by himself at the customer site 90% of the time, but with a minimum of system down time.
- He is trained to use all the diagnostic tools in solving these maintenance problems, to exchange major components readily available to him, and to call for help if the "fixes" don't work.
- Diagnostic software to assist the field engineer is maintained at division headquarters in Raleigh, N.C. Terminals, point-of-sale recorders, etc., can all be put "on-line" by the field engineer at the customer site and debugged on a remote basis.
- The field engineer also has access to the "Retain" system in Denver.
 - An extensive fault history/data base is maintained at this location.
 - This data base contains symptoms, faults and corrective action records according to all current system configurations.
 - This system can be accessed by the field engineer to provide probable causes and cures for the symptoms described.

- IBM's experience with this facility has proved to be an invaluable aid in diagnostics, logistics support, especially parts requirements planning, and training.
 - Repair centers are used centrally for repair and refurbishment of terminals, CTS products, and some General System Division Products.
 - These facilities are conventional for the industry. The only possible exception is that some terminal products are returned directly to these centers by the customer for repair.
 - Parts supplies are maintained at branch level and at strategically situated back-up centers. The field engineering system demands extremely rapid access to these centers.
 - Within the branch level, the field engineer has local back-up support from technical specialists. These specialists are on-call to the field engineer in the support of his customer site maintenance activities.
 - This local support is tailored to the branch requirements and may show considerable variability as a function of the type of systems for which the branch has maintenance responsibility.
4. IBM's PUBLIC VERSUS INTERNAL POSTURE TOWARDS SERVICE
- The public posture of IBM is that service is primarily a support arm for the marketing divisions. Perhaps in the early years this was true, but the separate and equal organization structure of field services signals a much more important role.
 - Within IBM, field service is a major revenue producer and is perhaps the largest single real source of profitability, even though allocations of cost and revenue tend to obscure this fact. The responsibility of field service for maintaining base revenues should not be underestimated.

- Field service provides an important competitive edge in maintaining "account control." Direct access to the customer on a daily basis is important. Overall responsibility for systems provides leverage over the component suppliers, and those suppliers with limited systems support capability. But these considerations are less important to IBM than the profits produced by the field service organization.

5. LACK OF ESCALATION PROCEDURES

- In contrast to the quite formal escalation policies within the maintenance organization of the telephone companies, IBM and other companies within the data processing industry function almost entirely without strict guidelines for communication and seeking assistance in the field.
- This informality is made possible by the remarkable delegation of authority at the branch level. Branch management has the responsibility of assessing the importance of the failure to the customer, the importance of the individual customer, and the capability of the branch level resources.
- There is a nominal "time to respond" and "time to repair" figure quoted as standard by IBM. Both figures are nominally two hours. In essence, this policy constitutes a rudimentary escalation procedure. If the field person cannot diagnose/repair the fault within two hours, the policy states that the problem must be referred to branch level.
- IBM's field engineers routinely seek help for problems outside their experience, training, and parts availability. They do not feel responsible for solving all maintenance problems themselves and are used to keeping the branch management level informed so that additional actions can be accomplished.
- Branch field engineering and sales managers can call upon virtually all resources of IBM, if the situation requires it. These resources even include orchestrating high level management to perform on the problem.

- This type of management philosophy requires mature judgement at the branch level, but does provide a positive environment in which it is possible to obtain solutions with maximum flexibility.

6. TRAINING POLICIES AND PROCEDURES

- It is IBM's fundamental policy that all field engineers will be trained to the same level of proficiency.
-
- As a result of this policy, IBM conducts extensive product and system level training.
 - Initial training requires about 15 weeks for most systems.
 - Field engineers spend about 10% to 15% of their time after initial training, in additional training activities conducted both at branch and division levels.
 - This training that is conducted on an on-going basis is to maintain proficiency levels and to provide new product training.
- An important element of IBM's training is the Field Instruction System.
 - FIS provides the capability to provide remote training at the branch level with a self-paced programmed instruction system.
 - About 50% of the training conducted at the branch level utilizes FIS and provides product refreshers, special products, and systems training.
- IBM will continue to develop more of these self-paced training techniques to be used at the branch level because of the significant cost saving associated with these types of training techniques.

7. IBM's ENTRY INTO THE VOICE/DATA COMMUNICATIONS MARKET

- There is no question that IBM will enter the communications business unless prevented from doing so by regulatory bodies.
 - INPUT believes that, in 1980, IBM will re-enter the processing services market. This means they will establish a network capable of handling sophisticated data communications and message switching requirements.
 - Their initial thrust will be to small/medium size customers, offering specialized applications, such as education services or access to common data bases.
 - With experience, the network facilities will be transferable to medium/large firms to handle the general needs of these customers.
 - With the availability of wide-band carrier facilities via SBS and/or other IBM participatory ventures, IBM will ultimately provide voice facilities on all digital networks.
 - Image transmission services will be an ultimate development.
- Outside of their processing services based offerings to medium and small companies, IBM will establish its communications facility offerings initially among the big customers.
- In the business community, IBM's ultimate goal is to "wire the world," permitting reasonably inexpensive inter and intra company transmission of voice, data, message, and image transmission on a single network.
- IBM realizes that ultimately it cannot maintain adequate growth or retain current profit levels on hardware sales or rentals.

- In the next five years, software and related services will account for at least 25% of IBM's revenue and profits as opposed to less than 5% today.
- Telecommunications is the ultimate delivery vehicle for software and/or information.

C. OTHER COMPETITORS

- Hewlett-Packard is the number two (next to DEC) "minicomputer" supplier. It has adopted a market thrust almost 100% devoted to the manufacturing sector. The company will not likely enter the integrated voice/data systems area in the foreseeable future.
 - Much of H-P's success can be traced to its stress on service, support, and software; H-P's commitment in this area has always been greater than its competitors.
 - H-P treats CEs as professionals. Along with IBM, they have the lowest service personnel attrition rate in the DP industry, about 6% annually, although that figure will rise slightly in 1979.
 - H-P has recently restructured its senior field service management. They are now extremely aggressive in this area and can be expected to introduce many innovative ways of providing service in the future.
 - Software maintenance is now in the process of being transferred to the field service organization.
 - H-P is making a substantial investment in developing new diagnostic methods.

- . The field service operation is being converted from a cost to a profit center.
- Xerox Business Systems (XBS) is a relatively new organization, formed from an amalgam of separate organizations that include such diverse operations as Daconics (word processors), Versatec (plotters), XCS (computer services), Diablo (daisy wheel printers), the remnants of XDS, and all of the other Xerox product areas which could be classified under the general heading "digital products." It is kept separate and distinct from the reprographics (copier) operation, Xerox's mainstream business.
 - Field service for XBS is not integrated with reprographics field service at the present time, although discussions have begun to search for ways to consolidate some activities such as sharing of spares depots.
 - The XBS group will be Xerox's spearhead into the integrated voice/data/image systems market. INPUT believes that next to IBM, Xerox will emerge as AT&T's most serious competitor.
 - Because of its size and "newness", XBS field service is far less rigid than the comparable reprographics operation. For example, at XBS service is unbundled and is seen as a potentially important revenue and profit generator.
- Rolm Corporation is an independent PABX supplier whose marketing and direct customer support is provided by interconnects.
 - Field service provides training and back-up to the interconnects. It is part of the marketing organization.
 - Board repair is provided by manufacturing. Field repair is primarily board swap.

- NEC America is the American subsidiary of Nippon Electric Company, responsible for distribution of NEC's PABX line. As with the other PABX suppliers, marketing and customer service is handled by interconnects.
 - NEC America's field service organization contains only 40 people, and is set up to provide training and back-up to interconnects. NEC people never see a customer.
 - Their organization contains a mix of Japanese engineers and American technicians with telco or computer backgrounds.
 - NEC does not perceive it will ever deal with users directly. This is in sharp contrast to Rolm and Northern Telecom, who at least perceive that the time will come when they will have to control their own distribution, financing, and support.
- Northern Telecom is part of the Bell Canada family and is one of the leading independent PABX suppliers in the U.S. As with the other independents, they work through independent interconnects who deal with the end customer.
 - Northern Telecom is a very aggressive company. Support facilities are far more extensive than other independents interviewed for this study. It appears to INPUT that Northern is poised to gradually assimilate its distributors.
 - The company stated emphatically that their service operation is a profit center.
 - It is likely that the PABX operation will eventually merge with their DP operations (Sycor, Data 100). In addition, they can be expected to acquire other companies with complementary products.
 - INPUT believes that Northern Telecom will emerge as a major competitor in the integrated system marketplace.

- Wang is one of the leading "small" companies offering word processing and small business computers. The two product lines are separated organizationally, except for field service, which handles all product lines.
 - In the computer area, the company is attempting to move towards providing systems to big customers. This ultimately will mean developing a communications (DDP) capability which the company does not have in strength now.
 - If successful, Wang could conceivably emerge as a leading competitor.
 - Service policies, now geared to maintaining lots of equipment in largely standalone, non-critical environments will have to change dramatically if Wang is to be successful.

IV RECOMMENDATIONS FOR FUTURE STUDY

IV RECOMMENDATIONS FOR FUTURE STUDY

- In the course of the research for the study and as a result of discussions with several AT&T people, INPUT has identified several areas which are worthy of further study. These are briefly identified in the following paragraphs.

A. ESCALATION PROCEDURES

- The necessity or relative importance of formal escalation procedures as they will impact AT&T's competitive posture needs to be better understood. Questions to be addressed include:
 - Should escalation procedures vary by type of product or customer? If so, what type of structure is most appropriate for each product/market segment?
 - What level(s) of commitment need be published?
 - How important or effective are escalation procedures as a competitive tool?
 - What are the customer's perceptions of escalation procedures? How much weight does he attach to them?

B. THIRD PARTY MAINTENANCE FUNCTION

- Earlier in this report, INPUT recommended that AT&T investigate the feasibility of offering services under which the company would assume field support responsibility for "foreign" systems attached to AT&T systems or networks. There are several issues to be examined, including:
 - What is the size of the revenue/profit potential (today, and the years to come)?
 - What level of acceptance or resistance to AT&T's implementation of this concept can be expected - from competitors - from customers?
 - To what extent will regulatory agencies hinder or promote the activity, vis-a-vis AT&T's participation?
 - Will implementation assist AT&T in other than direct financial ways? For example, would AT&T obtain better account control?
 - What is the dimension of the risk associated with entering the third party business?

C. SERVICE DISTRIBUTION

- New methods for distributing service are being introduced constantly. AT&T needs to understand the implications of each method or system upon its own operations. INPUT envisions a series of cost/benefit analyses done for each approach. Examples of the kinds of things that might be examined (in random order) are:
 - On-site stocking of spares (including sale of high mortality kits).

- Remote diagnostics.
 - User participation in diagnosis and/or repair and/or installation.
 - System support centers.
 - Regional/branch repair centers.
- One item in the above list (user participation) deserves special attention. This is a major issue at companies who traditionally have offered total "end-to-end" support as an underpinning of the way in which they conduct business. Encouraging user participation means a major change in policy which will have a significant impact on the way AT&T's business is conducted.
- A corollary question to be addressed is, "What does the user expect to get from his participation?"

D. SERVICE AS A PRODUCT

- In the addendum to this study is a position paper which addresses the concept of service as a product. INPUT states unequivocally that (at least in the Data Processing Industry) service will be a major contributor to corporate revenues and profits.
- AT&T should determine the revenue/profit opportunity from its own perspective.
 - If the size of the opportunity warrants further investigation, the means by which service is offered (by AT&T) as a product must be identified.
- For example, what are the tradeoffs between T&M and fixed price contracts? Which should be offered and under what

circumstances? Should maintenance contracts be bundled or unbundled - mandatory or optional?

E. PERSONNEL ACQUISITION AND TRAINING

- AT&T will have to bring new skills and management into its organization to deal with future requirements. In view of the continuing acute shortage of needed talent in the United States, coupled with AT&T's need for large numbers of people, a program designed to ensure an adequate supply of the right kind of people must be implemented.
 - Profiles of people that need to be brought in or retrained should be developed.
 - Potential sources of people must be identified and evaluated from a long-term perspective.
 - Ways to enhance AT&T's competitive recruitment posture need to be defined.
 - Compensation and other motivation practices need to be reviewed and changed if they prove to be inadequate.

APPENDIX A: INTERVIEW SUMMARIES

APPENDIX A: INTERVIEW SUMMARIES

- Hewlett-Packard
- IBM
- NEC America
- Northern Telecom
- Rolm
- Wang
- Xerox Business Systems

Hewlett-Packard

Interviewee: Michael Torgerson, Manager, Service Analysis and Planning

Describe the methods by which you presently deliver service:

On-site (resident) - Hewlett-Packard won't agree to dedicate a technician full time. In fact, few installations are large enough to require full time service. However, when work load justifies, they will assign a CE to a large installation.

- On-call - CEs are assigned accounts and get calls within territory assigned. On-call service basic to Hewlett-Packard.

User contributions to diagnosis or repair - User not permitted to touch machine (guarantee or maintenance contract will be voided).

Areas of remote diagnostics - Remote diagnostics are not used.

Use of system support centers - There is a system support center in each of five regions. There are five regions. Master back-up is in Santa Clara.

Use of central dispatch - Not used.

Use of central repair facilities - Data acquisition terminals are generally repaired centrally - increasing trend - some sites offer central repair.

Other - Can adapt to customer needs, especially in manufacturing environment.

Describe your service organization:

Organization structure - See attached exhibit.

Training programs and policies - Basic course is 12 weeks. Sixty percent hands on. Training at Santa Clara. Periodic retraining at home office. Each region has trainers who have classes at region headquarters and in branch. Hewlett-Packard uses little computer assisted training.

Relationship to marketing - Services and marketing are parallel organizations and both report to division president.

Describe the people in your service organization:

How many? - 1,200.

Backgrounds - Entry level. Most have background in "engineering technology." (Basically an AA degree.)

Geographic distribution - Total U.S.

Integration of hardware and software service - CE is expected to service simple O/S problems. Can access SE groups for support. Does not assist in application software problems.

Is your service operation a profit or cost center? - Profit center.

Do you put limits (geographically) upon where service will be made available? If so, where? - Only limited access environment.

Describe your policies toward service guarantees, warranties, and objectives:

Availability (time systems are available) - No guarantee.

Guarantees for MTTR - Will agree on response time. Commit to four hours, objective is two hours.

How do you express MTBF? - Printer - usage, other chronological.

What are your warranty policies? - Product - 90 days.

What is your attitude toward "consequential damages"? - Very much aware of problem. So far Hewlett-Packard has successfully avoided damages.

Do you provide any warranty or guarantees relating to the length of time you commit to support a product/system? - Hewlett-Packard will guarantee five years support after sale. Obviously will try longer, if economic.

Describe your attitude and/or practices toward servicing equipment in a multi-vendor network environment:

Division of vendor responsibility - "Unplug" system. Hewlett-Packard segregates responsibility by unplugging peripheral. If system performs correctly - peripheral at fault. Communications problems are considered differently.

Relationship with other equipment suppliers and carriers - Many of Hewlett-Packard hardware competitors use independent distributors and have fragmented service responsibility. Hewlett-Packard views servicing as a way to cement their advantages over distributors. Will go to great lengths to maintain "systems responsibility" and to keep preferred position with customer.

What is your attitude toward service competition? - Passive opposition.

Training - Some customers are trained on a charge basis - customers are segregated in special classes.

Documentation - Same as Hewlett-Packard.

Cooperation at site - Minimum - comes close to legally required minimum support.

Stocking and/or sale of spares - Yes.

Would your attitude be a function of the specific vendors involved? If not considered as competitors, either product or service, would be more cooperative.

Major system suppliers? - When Hewlett-Packard is subordinate element to other, will cooperate fully.

- Small/medium equipment suppliers? - Fight tooth and nail.

Describe the difference in your servicing provisions:

Contracts are the same. Economies of scale permit better service in areas of equipment concentration. However, all CEs, trained to some proficiency levels. Somewhat better back-up in metropolitan locations.

Do you perceive a need for third party service now? - No!

Systems architecture:

Functions performed - No major changes for five years at least.

Software versus firmware versus hardware - Not an issue.

Markets:

Marketing thrust will not change appreciably. Continue heavy emphasis on manufacturing.

Specifically, what methods of delivering maintenance services will be required?

More and better diagnostics.

How do you anticipate your people needs will change?

Need more customer orientation. There are great differences in customer requirements, especially OEMs. Have some highly technical applications.

Do you anticipate that hardware and software maintenance will be performed by the same people?

Hardware and Software will be performed by same people.

Describe your opinions as to the relative importance of service as revenue and profit:

Service is a very important contributor to revenue and profit. (Won't quantify.)

Remarks:

Torgerson left me somewhat unsatisfied.

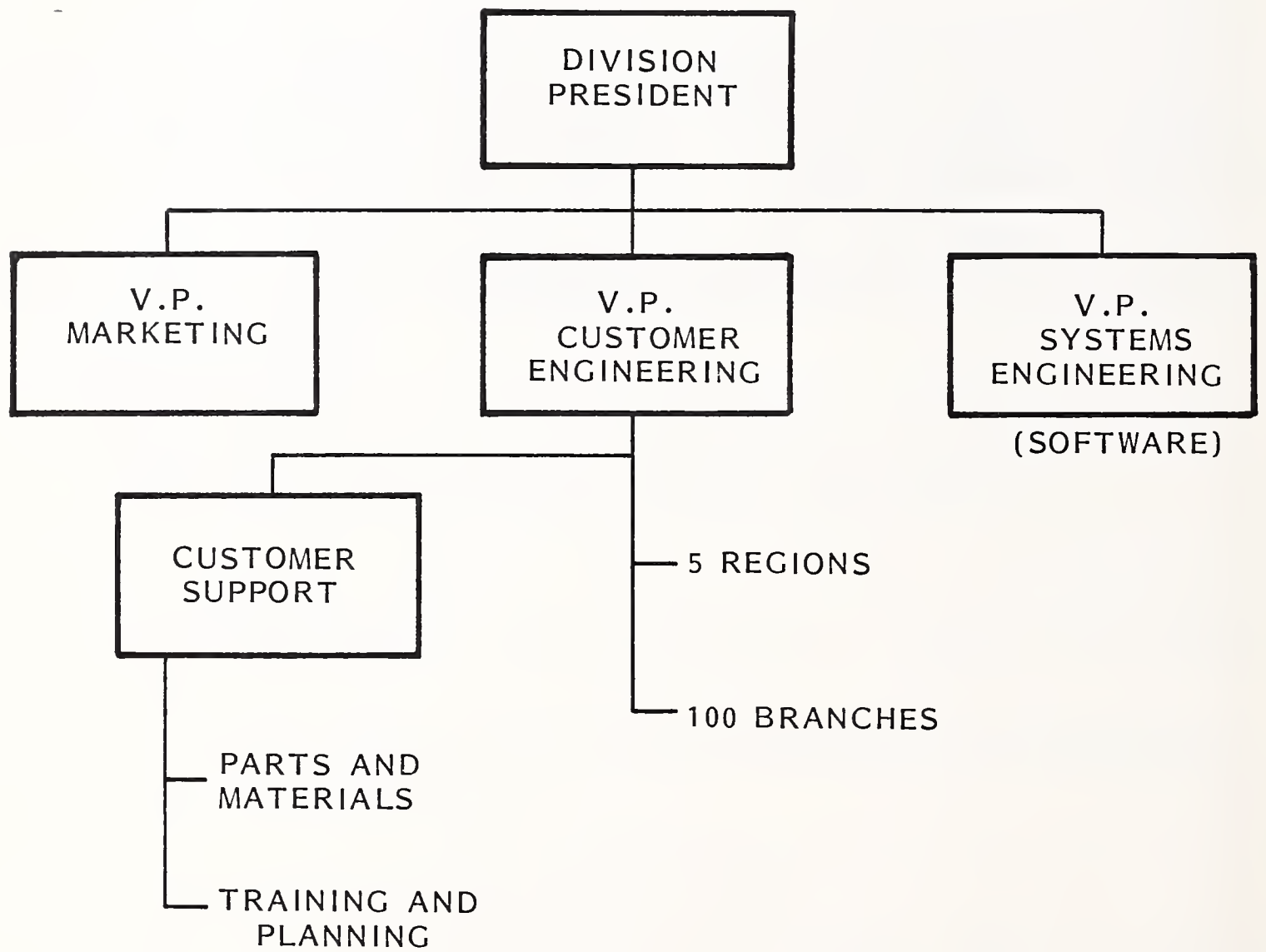
His "planning" orientation is idealistic, and while his answers checked as accurate reflections of conditions and policies, he is out of touch with the service marketplace.

Hewlett-Packard is aggressive and well managed. The branch structure is key to their competitive future, and customer control is essential. This means that improved and more imaginative service management will be developing in the near future.

Hewlett-Packard offers a broad line of computers, components, peripherals, terminals, and even modems. Products are both sold and leased - the emphasis is on sales. Products are handled by a company owned branch system, which is effective throughout the U.S. Customers are mostly medium sized companies, with special success among manufacturers.

Service is available under maintenance contracts and on a time and materials basis. Software maintenance is offered on a contract basis.

HEWLETT-PACKARD SERVICE
ORGANIZATION



IBM

Interviewee: David Robinson, Manager Field Service Planning, DPD, White Plains

Describe the methods by which you presently deliver service:

On-site (resident) - IBM may, at their sole discretion, provide an on-site, resident SE. They will never commit in advance or contract to provide for on-site service. It's their policy that the dedication of an on-site person is strictly a function of work load that's involved.

- On-call - Customer initiated service is basic to all IBM maintenance functions but we do know that diagnostic service is frequently run, etc. There is a monthly maintenance up-date or preventative maintenance activity. Basically IBM is an on-call organization.

User contributes to diagnosis or repair - User participation in services is limited to problem determination. While IBM has no philosophical problem with customer participation at that level, they are most emphatic that they will not permit or share with the customer or allied service organization to have access to or repair the equipment, if they are in fact responsible for its performance.

Areas of remote diagnostics - IBM has fairly exhaustive diagnostics, used especially for terminals and point-of-sale devices. This system is expanding rapidly to other pieces of equipment. The interview did not get into their fault history system that is maintained in Denver, but was primarily concerned with the Raleigh on-line system.

Use of system support centers - Raleigh is primarily responsible for telecommunication diagnostics and support. They have an on-line computer; they have supertechs and they do provide the back-up support, a good deal of the service documentation that relates to telecommunication pieces of equipment.

Use of central dispatch - Central dispatch: that is assigning the technician the next open task, particularly where the efficient use of people in routing is the objective, is not the way IBM basically does this. In each local area they have some flexibility and can adapt to the circumstances, but CE's generally have a feeling, and are encouraged to do so, of responsibility for particular accounts. So CE's, in general, are assigned to some grouping of customers who they see on some kind of a regular basis. There are exceptions to this but this is what they work toward. They do not take a group of people and dispatch them like AT&T might.

Use of on-site repair - IBM depends primarily on on-site repair, i.e., the technician and whatever parts and documentation are provided at the source, site of equipment. Now this varies a little bit where the same piece of equipment may be serviced by different organizations within IBM, General Systems versus DP.

Use of central repair facilities - Some terminals, particularly products like the 3604 and some of the point-of-sale equipment, are primarily repaired in the central facilities. The customer is obligated to carry or deliver the equipment to the central repair facility. Now in the case of terminals, this could be a shipping function where a standard container is used and the equipment is delivered UPS, or whatever, to this remote central repair facility. But they have another class of central repair facility where in a particular location there may be large numbers of terminals and customers responsible for bringing those terminals from their normal location to a central spot within the customers facility. This permits central repair of classes of equipment that IBM, in general, may not choose to service by their formal central repair activity.

Describe your service organization:

Organization structure - The service organization within IBM, as is IBM as a whole, is very complicated. This interview primarily concerned the DPMG and DPG groups. Within the DPMG, there's the DPD, the sales group and the FED service group. This is subdivided into 14 regions and 10 to 13 branches in each region. This is the primary line organization responsible for maintaining the class of equipment we are talking about. Within this branch system there are program support people who are liaison to central staffs which are responsible for software maintenance, others who are responsible for logistics or parts support, others who are responsible for training, etc. These are basically staff activities that are part of the DPMG group which is headquartered in White Plains. You will note that the field engineering group is separate throughout the entire field organization. At local levels there is a strong leadership role taken by marketing, but it is a separate line organization.

Training programs and policies - First, all IBM technicians are intended to be trained in the same way, to service equipment the same way regardless of location, regardless of the organization that they are part of. Initially, each technician attends a standard training program designed to acquaint him with all aspects of the policies and product. Once the SE is back in the field, 50% of training is provided by FIS (Field Instruction System). This is computer terminal training, highly interactive, and is used to acquaint the technician with new products, with variations in existing products, and refresher courses, etc. Increasing emphasis is being placed on this remote training function. It's a key to cost control.

Relationship to marketing - At all organization levels below DPMG they are separate, but there's no question that service exists to support marketing and to maintain the product lease base. There are some rumbles within service that service should be a business, but it's not reasonable to expect that to happen within the time frame that we're concerned about.

Describe the people in your service organization:

How many? - The total number of personnel in the FED (Field Engineering Division) of the area we're concerned about: 18,000 at the basic level. These are the people who have advanced education, non-union, have some form of technical background. However, it is quite clear that presently the emphasis is on communication skills, logic skills, and less and less emphasis on technical ability, specific diagnostic skills and certainly less on their technical education.

Geographic distribution - Throughout the U.S., and they claim to be able to provide service in any location. Of course there are obvious limits to this.

Integration of hardware and software service - At branch levels technical support assists the technician who feels he has a software problem. Can get service back-up from the staff organization who has a representative in his office, but there is no formal integration of hardware and software.

Is your service operation a profit or cost center? - Cost.

Do you put limits (geographically) upon where service will be made available? If so, where? - Yes. Public access is one and they are concerned with hostile environments, temperature, corrosives, etc. With these disclaimers/limitations they will provide service anywhere. Obviously there are pricing differences, but they will provide the service.

Describe your policies toward service guarantees, warranties, and objectives:

Availability (time systems are available) - There are no warranties on availability of equipment for specific periods of time or a specific response time, but they will work out objectives with their customers for permissible response. This does not constitute a guarantee. Similarly they will not guarantee a mean-time to repair.

How do they express MTBF? - Basically, they will express it in chronological time. However, certain pieces of equipment, for example, point-of-sales terminals, are calculated in hours of usage.

What is your attitude toward "consequential damages"? This is a very important issue in IBM. They deny responsibility but recognize and will admit that the problem exists and is well understood.

Do you provide any warranty or guarantee relating to the length of time you commit to support a product/system? - They will not make any such commitment in advance. They would not say what the service life calculations

were for logistics and parts support, etc. They claim that they will withdraw from service when the diminished population no longer permits them to supply the service. But as long as service is supplied they will commit to first level service, in other words they won't even offer to provide a degraded level of service. In the event that a product is going to be withdrawn from service, they claim that they'll provide at least one but usually two years advanced notice.

Describe your attitudes and/or practices toward servicing equipment in a multi-vendor network environment:

- Division of vendor responsibility - In division of vendor responsibility, IBM will agree to operate IBM equipment in the normal way, but will not accommodate other vendors with special help or special diagnostics. They will agree to run another company's diagnostics on their CPU or its equivalent because the IBM equipment supposedly will handle this in a normal way.

Relationship with other equipment suppliers and carriers - The subject of OEM suppliers goes far beyond communications as far as IBM is concerned and their attitude is that they will not interrelate with the other vendor, but will satisfy their obligations in the very strictly determined way.

Geographic limitations - Not a problem.

What is your attitude toward service competition? - Passive Opposition.

Training - They will provide training, materials, time, classroom, machine use, etc., all on a charge basis.

Documentation - They will provide the standard documentation for the product. That is, the information necessary to understand how the machine functions and the information necessary to locate faults and to correct them. They will not make available to service competition their special service aids designed to short cut diagnosis or repair, nor will they allow access to their special support system.

Cooperation at site - Finger-tip touching, not interlocking.

Stocking and/or sale of spares - Service parts are available at branch level, larger quantities at support centers, and even still larger at factory locations. Pricing is standard. They require that all parts procured be for service use and large quantity purchases need to be justified. Large quantity purchases need to be scheduled. They will not upset their own logistics flow for high volume purchases.

Would your attitude be a function of the specific vendors involved? - Yes.

In the case of the communications carriers they will agree with their customers to contact a communication carrier. Because of the nature of the

communication aspect of the interface they will, in general, work more closely with carriers than with component suppliers, whom they regard as their primary competitor. I would, however, expect this to change should AT&T begins to compete for service of IBM equipment and/or the component suppliers. Otherwise - no difference in attitudes with respect to Burroughs, that class the larger equipment houses and the smaller ones.

Describe differences in your servicing provisions:

IBM attempts to deliver a single class of service. Concentration of equipment tends to lend help to improve service, but that is simply a matter of economics of scale. They do not admit to offering any degraded service. Installation, etc., is not a particular problem for IBM because of the long lead time necessary to procure and deliver the hardware and to prepare the software. They do not obviously perceive a need for third party service, but recognize that it will exist. IBM will not disclose any cost information and/or profitability by division, etc. (it's not in their 10K.)

Systems architecture:

Functions performed - IBM will not comment on future products or the nature of systems that are not presently in their product line. Specifically they would not comment on PABX or FAX or things of this type. It's quite obvious that they expect to enter the data transmission business and intend to offer a wide range in the so-called office of the future. They were also somewhat guarded in their comments about the relationships between hardware and software, the trends and changes in diagnostics, other than the fact that they tend to use more diagnostics and more remote diagnostics.

Software versus firmware versus hardware - They do not see that the equipment to be offered in the range of 1985 to 1990 will place a significantly different service load than what they see as of now. With respect to markets, there is no comment, but they will say that they expect to increase the emphasis on support centers, for example Raleigh, also repair centers, and that they will provide back-up to the individual technicians in the field, subject to reliability. They expect that it's a requirement to improve the reliability with respect to hardware. (Recall that the interview is with the Data Processing Group, rather than the General Systems Group. One would expect that the problems of the 1980s would come more in the general systems area, where the smaller systems and the specialized systems would have increasingly great communications aspects and that the particular FE's would not be especially attuned to the problems of the communications aspects of this and therefore, will probably rely more on system, and perhaps more on special diagnostic equipment than the group we are specifically talking to.) They do not expect to change the methods of delivering maintenance as they view it, that is the on-line on-site service under the responsibility of an FE and responsible through the line organization - no change in the branch systems, certainly none in the dispatching, but they are looking for an increasingly generalist as the FE with field responsibility.

Do we expect any changes in attitudes in the way they interface with other vendors? - We would expect IBM to remain as "independent" as they are able to do. They see service as a major competitive weapon; not as a profit opportunity, but as a line of first defense toward their marketing activity. INPUT expects no change in terms of service guarantees or warranties, etc., or change in attitude with respect to third party maintenance or anything of this type.

How do you anticipate your people needs will change?

- The number will go up geometrically as these systems become increasingly complicated. They will try to respond with improved diagnostics with the other divisions and divided responsibility. This is particularly important with distributed data processing, as these systems take on more communications and more office of the future electronic mail, etc.

Do you anticipate that hardware and software maintenance will be performed by the same people?

Their problem of handling people is going to be very severe. They do not intend to combine the responsibility for hardware and software maintenance.

They would consider service not as a revenue producer, but their concern with cost control. They are concerned with efficiency and use of people, but they primarily will be expected to remain in their present posture in these subjects.

Do you expect to see service charges bundled or unbundled?

IBM would probably not subdivide their service offerings significantly, or unbundle them.

Communications - IBM will be one tough competitor as they always are. Their present posture is expected to continue and they would not deviate significantly in the area of communications, from what we see as a relationship with other vendors in the systems that are presently seen in the field. IBM will not consider shared service on IBM equipment in the future as they have not in the past.

Conclusion

Although public statements and official policy are intended to obscure the fact, IBM generates substantial profits through their service organization and service key to their future. Although IBM's public posture is that field service is a "cost center," it is known that field service pricing and allocations (on rental equipment) are established to provide a minimum 30% pre-tax return on revenues.

One must expect IBM to pursue service as aggressively as they can, consistent with their antitrust, FTC, and FCC legal constraints. Such developments as "Retain" and the special diagnostic aids - unavailable to service competitors, indicate a new

dimension to service competition, avoiding some of the legal pitfalls they've had with other anti-competitive tactics.

The planning organization and personnel are by far the best in the industry and will continue to dominate the field for the next five to ten years.

NEC America

Interviewee: Paul Cotter, Vice President of Marketing (Responsible for "Interconnect" Marketing)

Describe the methods by which you presently deliver service:

NEC offers back-up support only. Occasionally - supertechs go into field to fix difficult problems or to assist in special installation situations.

- User contributes to diagnosis or repair - Users do not assist in diagnosis and/or repair.

Areas of remote diagnostics - None.

Use of system support center - Offer same support as other PABX suppliers - five regional centers: Chicago, Santa Clara, Dallas, Atlanta, New York.

Use of central dispatch (Not applicable).

Use of on-site repair - (Not applicable).

Use of central repair facilities - Board repair primarily at Dallas plant.

Other - Technical training in Santa Clara and New York.

Describe your service organization:

Organization structure:

Vice President, Engineering

- Super Techs

- Technical Writing

Vice President, Marketing

- Logistics (Parts support)

- Training

The functions of service support are divided between engineering and marketing. No awareness in separate classes. No crossover with computer training.

Training programs and policies - Hands on training on five products. Products are taught in separate classes. No crossover with computer training.

Relationship to marketing - Service is an integral part of marketing.

Describe the people in your service organization:

How many? - Forty in service support.

Backgrounds - Japanese are full degree engineers on two to three year rotating assignments. Most have design background, relatively little "service" experience. Americans - primarily "Engineering Technology" from Telcos or computer manufacturing.

Integration of hardware and software service - Hardware oriented system. Software integral to hardware (Firmware).

Is your service operation a profit or cost center? - Function is strictly sales support.

Do you put limits (geographically) upon where service will be made available? If so, where? - No limits on service (Interconnects may set limits).

Describe your policies toward service guarantees, warranties, and objectives:

Availability - None.

Guarantee for MTTR - None.

How do you express MTBF? - Not an issue.

What are your warranty policies? - One year.

What is your attitude toward "consequential damages"? - Not an issue.

Do you provide any warranty or guarantees relating to the length of time you commit to support a product/system? - Ten years.

Describe your attitudes and/or practices toward servicing equipment in a multi-vendor network environment:

Division of vendor responsibility - Interconnect problem.

Relationship with other equipment suppliers and carriers - Interconnect problem.

Geographic limitations - Interconnect problem.

What is your attitude toward service competition? - Preventive.

Will only train customers. Documentation and parts sales only to customers.

Systems architecture:

Has no awareness of equipment design trends.

Markets:

No change expected in distribution.

How will the service organization have to change to meet the new market and product requirements?

Interconnects will need lots and lots of money to keep up.

Specifically, what methods of delivering maintenance services will be required?

Oppose on-line diagnostics.
Need more and better diagnostic equipment.
Need better training.

What will be requirement for third party service organizations?

Believe NEC can control competition.

How do you anticipate your people needs will change?

People needs will not change.

The President of NEC made a speech about the "Office of the Future" and "Home of Future," clearly anticipating computer, facsimile, telephone interface. He declared this will be a direction of NEC growth.

This has not been seen in the telephone area as a change of emphasis or direction. Cotter does not recognize inconsistencies.

Possibly major thrust will come through Honeywell and computer side of the business.

Seems like a sleeping giant.

Remarks

Cotter appears well postured in company, but is badly informed and has limited imagination and authority. If moves are planned in Japan, lead time will limit their adaptation to marketplace. Good interview with a puzzling company.

NEC America is a Japanese company. Products offered are Tel Com equipment and computers. These are sold through an entirely separate organization. Primarily, Honeywell markets the computers which they procure on an OEM basis. Telecommunication equipment is sold direct to telephone companies and to distributors (interconnects).

In the absence of end users sales, NEC service consists of service support similar to Northern Telecom and Rolm.

No special arrangements are made for the NEC facsimile equipment.

Northern Telecom

Interviewee: Lloyd A. Jones, Director of Marketing Operations

Describe the methods by which you presently deliver service:

On-site (resident) - Only provides this type of service through the Dallas organization.

On-call - In Dallas they do have on-call technicians but the support service group interviewed does provide supertechs on-call 24 hours/day and they service all of the interconnects and the Teleco's.

User contributes to diagnosis or repair - Their SL-1, the new unit, which is the most popular provided that they can leave the switch open and the central system can dial-in to monitor the performance of the system. The users may service it and Northern Telecom will support this. They'll run their diagnostics, they'll give them a health check and in the event that there is a failure they'll telex what the problem is and instruct the technician coming in in the morning what to do about it. This class of services is available to all of their customers.

Areas of remote diagnostics - Very heavily reliance on diagnostics, extremely complicated, extremely definitive diagnostics. These are run from Santa Clara - complete fault analysis down to what board is at fault this includes all of their equipment in the field.

Use of system support centers - One in Nashville and one in Santa Clara. Being a part of Bell Canada, it's totally separate from Bell but in Bellville, Canada there is another system provided, but that's totally outside of this interview.

Use of central dispatch - There is no central dispatch in the group interviewed. However, Dallas does provide for standard geographic coverage on a central dispatch basis.

Use of on-site repair - Normally, on-site repairs are limited to board exchanges and minor corrections. Primarily, all repairs, anything of any extensive nature, is done in service centers, that is particularly Santa Clara.

Use of central repair facilities - They do repair, rework, parts repair, all the warranty repair for both the telecos and the interconnects. Especially the telecos do very little repair themselves.

Describe your service organization:

Organization structure - Santa Clara facility a support facility, that is related to the product which is under it, reporting directly to the marketing manager and

with a dotted line to the president, and has a responsibility for the technical support of the product wherever it is in the U.S. They do have an interrelationship with the home office in Canada, again another dotted line, where the responsibility for design and for the development of the fundamental software is accomplished. On the other side there's a dotted line relationship that exists with the Dallas field organization. The Santa Clara group is responsible for the determination as well as methods of repair, for the training and documentation, as well as methods, parts support, etc. The organization is functional in character. The Dallas organization is a geographic organization that has within it a level of support similar to what they call the E-TAS, that is the Emergency Technical Assistance Center. So the individual technicians in the field first ask assistance from their own TAS center, of which there are three, West, Central, and East. The TAS centers, if they are unable to handle the problem refer it to Santa Clara.

Training programs and policies - Santa Clara provides all of the material. They will train 1,650 people this year. It's a normal classroom environment. Each course being approximately two weeks. They provide a diploma. It's essentially a board replacement, use of the diagnostics kind of training. It differed significantly from the IBM program.

Relationship to marketing - The Santa Clara office could be described as a sub-set of product management, and the service group in Dallas being a marketing support group. There is much comment about the independence of service. Lloyd Jones was emphatic about their profit motive and their independence. However, it's quite apparent that the real emphasis is in keeping equipment up, solving customer's difficult installation problems, and providing a high caliber of installation and support service. There is no emphasis whatever on seeking new ways to generate revenue, etc. While there is an independence from marketing, there is no question that they view service as being a function that maintain equipment in an up condition and the more service availability they have, the more competitive the product will be in the marketplace.

Describe the people in your service organization:

How many? Santa Clara has 67, and Dallas has 250.

Backgrounds - There two types: technicians from telephone companies, and/or degreed engineers.

Geographic Distribution - Geographic distribution is throughout the U.S.

Integration of hardware and software service - At the field support level it is highly integrated. In the field, there is no exposure of technicians to software maintenance.

Is your service operation a profit or cost center? Profit.

What kind of return do you seek from service? - Expect 15% return on cost. However, this really means that they get their cost covered by revenue. They have no idea of what the return on investment is or what a proper rate of growth is.

Do you put limits (geographically) upon where service will be made available? If so, where? - They do not place, other than physical, limitations on the geographical areas of service.

Describe your policies toward service guarantees, warranties, and objective:

Availability - They will permit a one hour outage at a maximum. If equipment is out longer than that, they expect a TWX to the president in Nashville. On service outages where the system goes down, they are required to maintain and provide to marketing and the line management the service history on any product that has had less than one hour system, i.e., document and record, down time and record what corrections are taken. This is the area where the real emphasis lies and that it is imperative to keep the equipment up.

Guarantee for MTTR - This a lot of emphasis on the redundancy in design in the equipment and that failures do not result in the system going down. They will not guarantee MTTR.

How do you express MTBF? They express MTBF in hours of usage (according to what Lloyd said). However, I really believe that he means chronological time when you explain it in terms of the concern about a system being down.

What are your warranty policies? One year on parts. They will provide any form of technical back-up for one year and they will warrant associated products, e.g., tape drives and other OEM devices, for the same period of time even though that's longer than the warranty provided by the original manufacturer.

What is your attitude toward "consequential damages"? They haven't been sued, there are no judgements, but they are very, very concerned. They gave me an example, of a particular hospital where there was a problem with the phone system and the lawyers called him personally, threatening real problems in case someone died as a result of the failure of the phone system.

Do you provide any warranty or guarantees relating to the length of time you commit to support a product/system? Explain policies toward service and stocking of spares - They will agree to support for warranty and will also agree to supply parts for ten years after the sale, but they really expect to provide for twenty years. Beyond that they'll support as long as profitable. Doesn't seem to have a program of encouraging a trade-out or sale by phasing out of service support of trade-in kind of attitude.

Describe your attitudes and/or practices toward servicing equipment in a multi-vendor network environment:

Divisions of vendor responsibility - Did not discuss Data 100, Sycor or their other divisions, and I believe they might also be responsible for Signetics. There was no indication that there would be a change in company organization that would pull these various groups in to a larger cohesive organization.

Their attitude basically towards servicing equipment in a multi-vendor network, is complete cooperation with anybody and everybody who is involved in the system. While a service policy has not evolved towards allied and competitive technicians: that is, where they are actually going out and competing, it's not aggressive in the marketplace and it doesn't appear likely that they will be.

Any change in policy that would come from this area would come out of the different class or type of competition that Data 100 and Sycor experience as opposed to the telephone switch systems.

What is your attitude toward service competition? Neutral. They will train anybody, they support anybody, their training is \$100/day/student. They provide the same documentation that their own people use. They cooperate at the site, they will stock and supply spares, there is no big difference between how they react to the communications common carriers, etc.

Describe differences in your servicing provision for:

Different sizes of customers - They treat telecos differently than they do the contract service. In the case of the telecos, it's a much closer relationship. Do not see differences related to specific policies, however, but maybe in attitudes and how they behave with exceptions to the policies. Their servicing provisions do alter their service pattern. Dallas, in the remote areas where there is less back-up, the technicians do have more experience, are more self-reliant and are trained to a higher standard of performance.

In future, will certainly commit to full time residents.

Do you perceive a need for third party service now? Yes.

They will continue to support third party service and will cooperate with third party service.

How is your company's revenue/profit split between:

Hardware sales, service, and software. - They would not commit to stating what their profitability was or what the relationships were, etc.

Systems architecture:

Functions performed - Sees systems becoming smaller, emphasis on power saving, more features, a great increase in the software component, speech terminals, special CRT displays, etc. Can expect, in their area, that the systems and function will change very little in the next five years.

Software versus firmware versus hardware - There will be more and more software and some more firmware. There was no discussion of the trade-offs between the service and characteristics of these.

Markets:

Sizes of customers - No major change, although it was stated that there will be more and more service. Service will be more important.

Reliability:

Hardware - Hardware will slightly improve, software will be better. There are real cost problems in the developing of software service and the developing of software. Most critical of way the company managed the software support in general. He was highly critical of other parts of the company - (may be a personal thing).

How will the service organization have to change to meet the new market and product requirements?

Possible for more on-line/remote diagnosis in the future and that he expects that their system will support other service organizations, etc. He views a geometric explosion in the nature of these remote diagnostics and he sees himself and his particular organization, Santa Clara, being the cornerstone for all service organizations maintaining Northern Telecom equipment.

Specifically, what methods of delivering maintenance services will be required?

Doesn't see any changes in the methods of delivering maintenance services.

Do you anticipate any changes in you attitudes to the way in which you interface to other vendors?

Doesn't see any changes in the attitudes with respect to service of other vendors.

What changes do you anticipate concerning service "guarantees" and warranties?

Doesn't see any changes in guarantees and warranties.

Will there be a requirement for third party service organizations? If so, in what context?

Doen't see a change in third party maintenance.

How do you anticipate your people needs will change?

Technicians will become less sophisticated at the field level...and as a consequence the type of people in the support functions will be very much stronger. He feels it will be even more important for ETAS to know an awful lot more about software because he feels that will be more important.

Do you anticipate that hardware and software maintenance will be performed by the same people? - Yes.

Do you expect to see service charges bundled or unbundled?

- Service is going to be an increased profit contributor. Also feels that in the service area, the small user is neglected and that his part of the industry will have to adapt more towards the needs of the small user.

Remarks

So-so interview. Political relationships within Northern Telecom, especially between Dallas and Santa Clara, seem to color Lloyd Jones opinions and judgement significantly. Couldn't be sure where answers were unduly biased.

With the acquisitions by the parent, this can develop into an important force in the industry. While not expected to be dominant, this company will bear watching.

Northern Tel Com is a Canadian company - The parent company is aggressively acquiring firms in the data processing/communications markets. At this time there are no lateral relationships between subsidiaries. Telecommunications equipment is sold direct to Telephone Companies and to "Factory Authorized Contractors" and some sales to end users. Primary product is a digital switching system, the SL-1.

Service consists of support to telcos, interconnects, and the Direct Sales Group headquartered in Dallas. The support function is like that of the Telcom competitors and D.P. service support. The Dallas organization is of growing importance. Where known, the Dallas policies have been included.

Rolm Corporation

Interviewee: Gill Gunther, Director of Field Operations

Describe the methods by which you presently deliver service:

On-site (resident) - Rolm is only a support organization.

On-Call - Rolm is only a support organization.

User contributes to diagnosis or repair - Rolm is only a support organization.

Areas of remote diagnostics - They do use extensive remote diagnostics intended toward board replacement diagnosis of I/O devices and magnetic tape devices.

Use of system support centers - They have three system support centers located in Santa Clara, Dallas, and Washington. They have supertechns in residence and diagnostics. They have remote access to the system and there is no charge for most emergency calls. They will send supertechns out on a time and material basis to support either their independent telcos that they related to or the interconnects.

Use of on-site repair - There is some on-site repair. However, it is an extreme case and is probably related to installation problems rather than warranty or fault analysis.

Use of central repair facilities - Santa Clara provides board repair. They offer 24 hour turnaround on boards. Manufacturing organization reworks the board and they expect, as they get into trade-ins, that they will do some refurbishing of used equipment under the manufacturing operation. (Incidentally, along the lines of the Northern Telcom interview, they require the telco or distributor to call Rolm anytime there is a system outage.)

Describe your service organization:

Organization structure - The service organization reports to the Vice President of Marketing and has a dotted line to the Vice President and General Manager. In the service area they have product support, material control, training, field service and they do have national accounts managers. This is the special customer emphasis people who are liaison, particularly to telcos.

Training programs and policies - Training is performed in Santa Clara and Washington, it is classroom, hands-on. Comprehensive maintenance - takes four weeks - fee to distributors and telcos.

Relationship to marketing - Absolute - they report to the Vice President of Marketing.

Describe the people in your service organization:

How many? - 112 in support activity, 55 available to field. Much larger than Northern Telecom, but a drop in the bucket compared to IBM.

Backgrounds - Computer or telephony. They now prefer computer backgrounds because of their knowledge of software, their knowledge of digital logic and that they can stand the customer difficulty/problem environment that they are increasingly called on to perform in.

Geographic Distribution - Three centers: Santa Clara, Dallas and Washington.

Integration of hardware and software service - They claim to offer a completely integrated support system.

Is your service operation a profit or cost center? - Service operation is a cost center.

Do you put limits (geographically) upon where service will be made available? If so, where? - This is a matter of distributor policy with the independent distributors.

Describe your policies toward service guarantees, warranties, and objectives:

Availability (time systems are available) - With the time available, they will provide around the clock support.

Guarantee for MTTR - No guarantees on mean time to repair.

How do you express MTBF? - Express MTBF in chronological time.

What are your warranty policies? - Will guarantee one year from date of shipment.

What is your attitude toward "consequential damages"? - It is not a big deal, no big concern about it.

Do you provide any warranty or guarantee relating to the length of time you commit to support a product/system? Explain policies toward service and stocking of spares. - Commit to provide service support for a period of ten years, would go beyond if necessary or advisable.

Describe your attitudes and/or practices toward servicing equipment in a multi-vendor network environment:

Divisions of vendor responsibility - Multi-vendor relationship. Distributor is an absolute exclusive within the areas of their geographic franchise, so they will not deal with anyone other than the distributor or the telcos.

What is your attitude toward service competition? - Prevention.

Describe differences in your servicing provisions for:

- Different size of customers - Again, this is related to their distributors. The distributors make significant differences with respect to customers and are very adaptive in the field.

Do you perceive a need for third party service now? - No.

How is your company's revenues/profit split between: - Revenue considered hardware oriented, no subdivision on this one.

Systems architecture

Functions performed - Office of the future will begin to exist in five years in terms of security, mail, data processing, increasing number of terminals; and their diagnostics and support must expand to be able to exercise the new devices that they'll find on the systems. Doesn't seem to be a change in policy that relates to them becoming more aggressive in terms of what they themselves are offering in this regard.

Software versus firmware versus hardware - They say that it's mostly software now and that they see in the future, if you wanted to divide emphasis, that 60% software, 10% firmware, 30% hardware.

Markets - They do not see changes in the way that service will be provided over this period of time.

Reliability

Hardware - Hardware improved a little, but basically they are dealing in a software world and see bulk of improvements to come in software, more software, better performing software.

How will the service organization have to change to meet the new market and product requirements? - Relate to individual market segments, if possible.

Specifically, what methods of delivering maintenance services will be required?

No change.

Do you anticipate any changes in your attitudes to the way in which you interface (at the service level) to other vendors? If so, explain:

No change.

What changes do you anticipate concerning service "guarantees" and warranties?

No change.

Will there be a requirement for third party service organizations? If so, in what context?

- They will continue to oppose the development of third party maintenance.

How do you anticipate your people needs will change? (Quantity, background, distribution.)

They believe that in five years there will be no change, but in ten years there will be some changes. An overview is: today we have craftsmen, tomorrow we need more engineers and software people. They also see the user more involved in the future than he is now.

Do you anticipate that hardware and software maintenance will be performed by the same people? - Yes.

Describe your opinions as to the relative importance of service as:

Revenue contributor - In five years, the attitude of support essential to marketing, but beyond that it's possible that service could be viewed in its own right. My own view - not a chance.

Do you expect to see service charges bundled or unbundled? Explain the circumstances. - They feel that it's possible in this time frame that local service from a distributor may be proved to be redundant on the view of the improved and greatly increased diagnostics and that the distributor may be a source for repair parts but would be out of the diagnosis/repair loop.

Other comments - The distributor may evolve to handle I/Os. Certainly some of them will. But they are not capable of doing it now. They expect to see major changes in the distributors because these are largely small and ineffective.

Remarks

Good interview - Rolm seems to have schizophrenic attitude about taking over interconnects and competing with telcos - company seems to be very well managed and highly aggressive. Surprisingly - no crossover with computer division.

Rolm offers telecommunications products and military computers. The divisions function separately and quite independently. There is almost no technical or marketing crossover between the divisions.

The tel com products are sold through two channels of distribution - Telcos, independent telephone companies, and distributors, basically "interconnects." There are no sales to end users. However, Rolm owns, outright, three interconnects operating in Illinois, Michigan, and New England.

In the absence of end user contact, Rolm service consists exclusively of service support. In this respect, it is similar to NEC, Northern Telecom, and the "support" functions of the DP companies.

Wang

Interviewee: Perry Tally, Director of Field Engineering - (Technical Support)

Describe the methods by which you presently deliver service:

On-site (resident) - Very few full time CEs - Wang reserves right to assign dedicated CE.

On-call - On-call service is basic to Wang. Wang uses five man territories with field supervision. Within territory, CE usually takes next call up except for call backs and special customer situations.

User contributes to diagnosis or repair - Customers may run diagnostics (presumably to determine if fault is software, operator, or hardware).

Areas of remote diagnostics - Not using remote diagnostics now. This is important to national accounts. There are problems with cost/benefit ratio. An alternative being considered is portable maintenance computer.

Use of system support centers - Presently Wang is using a hotline staffed by supertechs. Planning to decentralize to areas.

Use of central dispatch - Typical branch structure.

Use of on-site repair - Typical branch structure.

Use of central repair facilities - Board repair primarily done at home office (some work done in "area" headquarters). Fault analysis supported by "bed of nails" ATE at home office. Much too costly to provide at "area" locations.

Describe your service organization:

Organization structure:

V.P. C/E

- | | | | | |
|-------|-----------|-------------|-------------|----------------------|
| - MIS | - Fin/Adm | - Areas | - Logistics | - Technical Training |
| | | - Districts | | - Planning |
| | | - Branches | | - Field Support |
| | | | | - Board Repairs |
| | | | | - Tech Writing |

Training programs and policies -

Entry level - 15 weeks, two-thirds hands on
Mid level - 7 weeks, two-thirds hands on
High level - 3 weeks, two-thirds hand on

Wang uses terminals and audio visuals for pre-training, refreshers, and accessories.

Relationship to marketing - Vice President of Customer Engineering reports to Executive Vice President of Field Operations.

Describe the people in your service organization:

How many? - 400 in support, 1100 in field.

Background - Entry level, very few. Wang hires senior persons where possible, usually with more than five years experience. Usually obtain beginners from military.

Geographic distribution - 110 branches in U.S.

Integration of hardware and software service - Software is not integrated with hardware service.

Is your service operation a profit or cost center? - Cost center.

Do you put limits (geographically) upon where service will be made available? If so, where? - Service can have reasonable access.

Describe your policies toward service guarantees, warranties, and objectives:

Availability (time systems are available) - Wang has some contracts which permit chargeback if "up-time" falls below limit.

Guarantee for MTTR - None.

How do you express MTBF? - Not an issue.

What are your warranty policies? - Equipment is guaranteed for 90 days. T&M service for 30 days.

What is your attitude toward "consequential damages"? - Not an issue.

Do you provide any warranty or guarantees relating to the length of time you commit to support a product/system? - None provided. Company has yet to face the problem.

Describe your attitudes and/or practices toward servicing equipment in a multi-vendor network environment:

Division of vendor responsibility - With exception of modems and phone lines, where Wang cooperates completely, Wang requires system responsibility. Doesn't have problem with peripheral supplies.

Relationship with other equipment suppliers and carriers - None.

Geographic limitations - None.

What is your attitude toward service competition? - Somewhere between passive opposition and prevention.

Training - At hourly rate (very high cost).

Documentation - Same as Wang, but with some pieces removed.

Cooperation at site - None.

Stocking and/or sale of spares - At Wang headquarters, not usually available at branch. Some at "area."

Would your attitude be function of the specific vendors involved? If yes, how do you feel about carriers? - Same attitude as H.P.

Describe differences in your servicing provisions:

Wang is well aware of relationship between distance, number of products, training, and back-up. Adjusts provision to accommodate situation (more training support in rural areas).

Do you perceive a need for third party service now? - Extremely remote locations and special equipment. (Usually handled by customer.)

Systems architecture:

Functions performed - Increasing use of software in 1980s.

Software versus firmware versus hardware - Firmware is on way out of Wang systems.

Markets:

Product line is moving toward larger systems and larger customers - Word Processors are an exception.

How will the service organization have to change to meet the new market and product requirements?

Problems expected in crossover with word processing and as software responsibilities increase.

How do you anticipate your people needs will change?

Expect to continue to hire supertechs. However, experiments with "Sylvania" type course look promising.

Do you anticipate that hardware and software maintenance will be performed by the same people?

Some software problems in word processing will be handled by service, otherwise by separate organization.

Remarks

Tally was a good subject - technically Wang seems to lag H.P., but they provide superior support. Profit not yet an issue, but will change service dramatically.

Wang is well established in the medium sized computer and word processing fields. In addition to mainframes, Wang offers a number of peripherals and terminals. Products are sold, but there are some leases. Emphasis is overwhelmingly on sales. Products are handled by a network of company owned branch locations. Customers are small to medium sized companies, located throughout the U.S. and Europe.

Most systems are supported by maintenance contracts, although there are a small number of time and material customers. Software maintenance is offered, but as a responsibility of marketing.

Xerox Business Systems

Interviewee: Reobert Newell, Manager, Service, Business Systems Division

Describe the methods by which you presently deliver service:

On-site (resident) - Does not offer. Expect to in future, will require crossover with reprographic service.

- On-Call - Basic method of providing service. Calls given to CE in advance for territory. Organizing into three man mini teams, with each man assigned a primary territory and as back-up in other areas. Experimentally, giving CE only his next call.

User contributes to diagnosis or repair - No user contributions are expected. User initiates trouble call.

Areas of remote diagnostics - Xerox offers "on-line" diagnostics for 9700 non-impact printer from El Segundo, CA. Diagnostics provided are "exercises" and some fault logic tracing.

Use of system support centers - Hotline and supertechs are provided as usual. New wrinkle - "800" phone number to center with girls (particularly W/P calls) talking to user attempting to minimize emergency service and to eliminate some calls altogether. It is claimed that 50% of on-site calls are eliminated.

Use of central repair facilities - Board repair - El Segundo, CA.

Other - New idea - CEs do mini preventive maintenance repairs to avoid unscheduled calls. Frequent problem sources are treated when on-site, even for other problems.

Describe your service organization:

Organization structure - See attached exhibit.

Training program and policies - Primarily training is "hands on" and self-paced in a classroom setting in Leesburg, VA; 75% of time on equipment and 25% theory. Terminals and "accessories" are taught in branch. Xerox is just now experimenting with interactive training on computer. They have used microfiche successfully in the past.

Relationship to marketing - Service and marketing are parallel organizations reporting to the president.

Describe the people in your service organization:

How Many? - 175 in headquarters support, 800 in field (Reprographics has 4,000).

Backgrounds - At entry level - most have AA degree in electronics, many have had service experience with other computer peripherals. In general, don't want more than high school or AA level in technical skills. Increasing emphasis on customer and communications skills.

Geographic distribution - Total U.S.

- Integration of hardware and software service - Applications programs not covered. Operations support programs included.

Is your service operation a profit or cost center? - Profit center.

Do you put limits (geographically) upon where service will be made available?
- Generally limited to economic access. Remote locations can get service at premium rates.

Describe your policies toward service guarantees, warranties, and objectives:

Availability (time systems are available) - Generally try to work out "objectives" with customer. They expect to offer flat guarantees in future. Apparently Xerox tries to treat GSA commitments literally.

Guarantee for MTTR - No guarantee.

How do you express MTBF? - Reprographics considers MTBF relative to usage, otherwise W/P on chronological time.

What are your warranty policies? - Offers time and material service. (30 and 90 day guarantees.)

What is your attitude toward "consequential damages"? - Field personnel still not aware of the potential seriousness of problem.

Do you provide any warranty or guarantee relating to the length of time you commit to support a product/system? - Xerox prepares a moving seven year life cycle product plan. Will make no other commitments (de facto seven year commitments).

Describe your attitudes and/or practices toward servicing equipment in a multi-vendor network environment:

Division of vendor responsibility - Xerox goes further than the "unplug" test, but hardly walks the second mile. Has problems on communications side. Has hired some "comm. specialists." Heavy emphasis on C/S centers.

Relationships with other equipment suppliers and carriers - Normal relationships with OEMs, etc.

Geographic limitations - None.

What is your attitude toward service competition? Encouraging. Especially Sorbus, etc., for uneconomic locations.

Training - Yes, charge service vendors for it.

Documentation - Same as Xerox.

- Cooperation at site - None.

Stocking and/or sale of spares - Yes. Carriers are not considered competitors.

Describe differences in your servicing provisions for:

Different sizes of customers - Economics determines response in these areas. In general, larger customers and metropolitan users get better service with more support.

Do you perceive a need for third party service now? - Yes.

Where - uneconomic locations.

Under what conditions - System responsibility problem.

Systems architecture:

A&B - Expect to see better delineation between hardware and software. Host software to generate "fault sequences" for subordinate peripherals. No basic changes expected in five years, but numerous refinements. Firmware is not significant, and certainly not expected to become more important.

Markets

Expect very significant growth in the Business Systems group. A young organization, formed from relatively distinct groups - will see increased selling emphasis - rounding out product line. Expect little change in customer mix, but some change in equipment offered - will continue to serve U.S.

Reliability

A&B - Expect hardware to improve slightly - mechanical devices will remain at the same technology level. Software will show most improvement in reliability. "On-line" diagnostics will be in use by all communications devices.

How will the service organization have to change to meet the new market and product requirements?

The service organization will not see significant changes. Certainly no changes in reporting structure. There will be a number of new branches and some additional support functions. Training will receive increased emphasis.

Specifically, what methods of delivering maintenance services will be required?

The CSC (Customer Support Center) has proven to be quite successful. This concept will be expanded - perhaps involving more customer participation.

Do you anticipate any changes in your attitudes to the way in which you interface (at the service level) to other vendors? If so, explain:

Expect no changes in attitudes at the service level.

What changes do you anticipate concerning service "guarantees" and warranties?

There will be increasing emphasis on "objectives," some of which will evolve into guarantees. Initially these guarantees will probably be local in nature.

Will there be a requirement for third party service organizations? If so, in what context?

There is, and will continue to be, a requirement for third party service - remote locations, and single source maintenance responsibility. Daconics, a Xerox subsidiary, although not handled well, indicates feasibility of handling service on competitive products.

How do you anticipate your people needs will change? (Quantity, background, distribution.)

Basic people needs will not change. Future will see less emphasis on technical preparation and skills.

Do you anticipate that hardware and software maintenance will be performed by the same people?

More software exposure by technicians, but software packages are too specialized and need programming skills beyond field needs.

Describe your opinions as to the relative importance of service:

Service will be more important as a revenue and profit producer.

Do you expect to see service charges bundled or unbundled? Explain the circumstances.

Service will continue to be unbundled.

Remarks

Xerox will be the number two force following IBM.

- Resources.
- Product line.
- Imaginative marketing and servicing.

Special attention should be paid to Xerox methods of territory coverage, flexible maintenance arrangements, and service planning and management.

Service is very important contributor to profits. In the future, look for real "marketing" of service. As the product line grows, Xerox Business Systems will emerge from the group of secondary contenders in the industry.

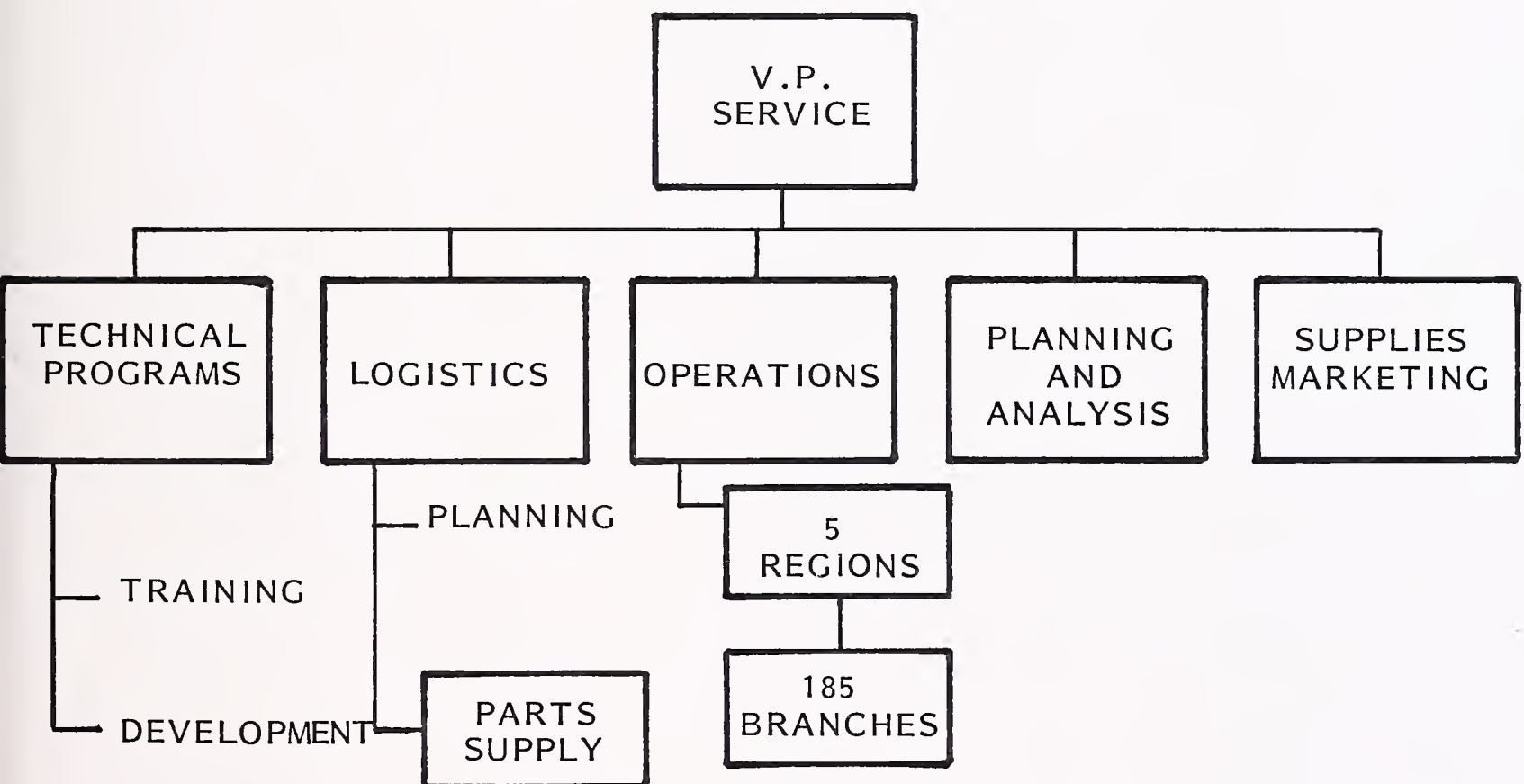
Xerox Business Systems is a relatively new but very dynamic part of Xerox. Presently, the product line consists of impact and non-impact printers, facsimile devices, on-line word processors, etc. Products are both sold and leased throughout the U.S.

Customers are primarily large and medium sized companies - service is available under maintenance contracts and on a time and materials basis. Service is included "bundled" on leases. Incidentally, in key cities 24 hour service is available. Xerox is considering "priority response time" contracts at premium prices.

The "800 - 850" Electronic Typing Terminals may evolve toward distributed data processing systems. (Consider Shasta - the small computer system offered by Diablo, a XBS subsidiary.) This development will expand the XBS role to a position of real importance in the industry.

Presently, software maintenance is not significant, except for word processing.

XEROX BUSINESS SYSTEMS
ORGANIZATION



APPENDIX B: INTERVIEW QUESTIONNAIRE

VENDOR QUESTIONNAIRE

1. Describe the products and systems you currently provide that are or could be used in an integrated communications/data processing/text processing system (office of the future) in the following terms:
 - A. Functions performed
 - B. Pricing structure
 - C. Distribution system
 - D. Terms of sale (lease, purchase, rent)
 - E. Types of maintenance contracts sold
 - F. Distinction, if any, between hardware and software maintenance
2. For each product mentioned in question 1, describe the markets to which the products are directed:
 - A. By size of customer (employees, sales, assets, etc.)
 - B. Industry Sector
 - C. Function within industry or cross-industry
 - D. Geographic distribution

INTERVIEWER NOTE: USE SEPARATE SHEET FOR EACH PRODUCT/SYSTEM DESCRIPTION

3. Describe the methods by which you presently deliver service:

A. ☐ On-site (resident); explain _____

B. ☐ On-call; explain _____

C. ☐ User contributes to diagnosis or repair; explain _____

D. ☐ Areas of remote diagnostics; explain_____

E. ☐ Use of system support centers; explain_____

F. ☐ Use of central dispatch; explain_____

G. ☐ Use of on-site repair, explain_____

H. ☐ Use of central repair facilities; explain_____

I. ☐ Other; explain_____

- 4. Describe your service organization as follows:
 - A. Organization structure (block diagram ok)

B. Training programs and policies _____

C. Relationship to marketing _____

D. Describe the people in your service organization:

How many? _____

Backgrounds _____

Geographic Distribution _____

E. Integration of hardware and software service _____

F. Is your service operation a profit or cost center? _____

What kind of a return do you seek from service? _____

G. Do you put limits (geographically) upon where service will be made available? If so, where _____

5. Describe your policies toward service guarantees, warranties, and objective:

A. Availability (time systems are available) _____

B. Guarantee for MTTR _____

C. How do you express MTBF?

☐ Hours of usage

☐ Chronological time

Explain _____

D. What are your warranty policies? _____

E. What is your attitude toward "consequential damages?" _____

F. Do you provide any warranty or guarantees relating to the length of time you commit to support a product/system? Explain policies toward service and stocking of spares _____

6. Describe your attitudes and/or practices toward servicing equipment in a multi-vendor network environment:

A. Divisions of vendor responsibility_____

B. Relationships with other equipment suppliers and carriers_____

C. Geographic limitations_____

D. What is your attitude toward service competition?

☐ Neutral ☐ Encouraging ☐ Passive Opposition ☐ Prevention

If any of the first three, what are your policies with regard to:

Training_____

Documentation_____

Cooperation at site_____

Stocking and/or sale of spares_____

INPUT

Would your attitude be a function of the specific vendors involved? ☐ Yes ☐ No

If yes, how do you feel about carriers (AT&T, GTE, Bell Canada, etc.)?

Major system suppliers (IBM, Burroughs, etc.)?

Small/medium equipment suppliers (Four-Phase, Microdata, Interdata, etc.)?

7. Describe differences in your servicing provisions for:

Different sizes of customers

Remote versus metropolitan location

System size

8. Do you perceive a need for third party service now? ☐ Yes ☐ No If yes,

Where _____

Under what conditions _____

9. How is your company's revenue/profit split between:

	Percent Revenue	Percent Profit
Hardware sales	_____	_____
Service	_____	_____
Software	_____	_____

The next set of questions deal with your view of the way in which service policies and practices will evolve over the next five to ten years. Please give us your impressions of the following items in this context:

10. Systems architecture

A. Functions performed _____

B. Software vs. firmware vs. hardware _____

11. Markets

- A. Sizes of customers _____

- B. Geographic distribution _____

- C. Functional coverage _____

12. Reliability

- A. Hardware _____

- B. Software _____

13. How will the service organization have to change to meet the new market and product requirements? Relate to individual market segments if possible.

14. Specifically, what methods of delivering maintenance services will be required? _____

15. Do you anticipate any changes in your attitudes to the way in which you interface (at the service level) to other vendors? If so, explain:

16. What changes do you anticipate concerning service "guarantees" and warranties?

17. Will there be a requirement for third party service organizations? If so, in what context? _____

18. How do you anticipate your people needs will change? (Quantity, background, distribution.) _____

19. Do you anticipate that hardware and software maintenance will be performed by the same people? ☐ Yes ☐ No

20. Describe your opinions as to the relative importance of service as:

A. Revenue contributor _____

B. Profit contributor _____

21. Do you expect to see service charges bundled or unbundled? Explain the circumstances _____

22. Other comments _____

ADDENDUM A: POSITION PAPER:
SERVICE PERSON OF THE FUTURE

ADDENDUM A: POSITION PAPER:
 SERVICE PERSON OF THE FUTURE

SUMMARY

- By the mid-1980s, three types of people will be required to meet the service demands of the integrated computer/office/communications systems in place at that time:
 - Local Field Service Technicians, whose function is to handle routine testing and maintenance functions requiring "cookbook" methods.
 - Local Field Service Support Specialists, whose function is to diagnose problems too difficult for the technicians. He may also participate with marketing in the design and sale of service support contracts.
 - Central Site or Regional Support Specialists, whose function is to support the field on problems that cannot be handled with local skills.
- This tri-level hierarchy of people each have their own role in the service organization, and each perform different functions and interface with customers in different ways and often on different levels. Thus, the skills and training requirements are different for each level.

- Of economic necessity, some of the functional requirements of the three levels may overlap, depending on customer base, product line density, geographic dispersion of specific products, and other factors.
- The service person requirements of the future, as projected here, align closely with INPUT's prognosis of IBM's future service philosophy which is just beginning to evolve.

HISTORICAL PERSPECTIVE/DRIVING FORCES

- Ten years ago, the typical new hire field service technician in the computer industry was hired with a minimum of a two-year, A.A degree in electronics or several years experience, usually military.
 - A few companies, notably IBM, hired a high percentage of four-year degree individuals with engineering backgrounds.
- With this background, technicians already had a solid grounding in electronics. They needed only to be trained on specific pieces of equipment.
- Software systems were rudimentary compared to today's products. Not only that, but most users were relatively sophisticated and could very often distinguish, themselves, between a hardware and a software fault.
- By the very nature of their jobs (in the field, remote from headquarters) and the way they were managed, field service technicians were generally self-motivated loners who operated relatively independently from the rest of the company.

- Again, IBM is a notable exception. As IBM developed its concept of account control, the field service technicians (called a C.E., customer engineer) were part of an integrated team that contained marketing, design, software, and field service elements.
- Today, the environment has changed significantly. Of necessity, the composition of the field service force has begun to change to meet the new demands. Not only are the skill requirements changing, but also the methods of delivering service must change to meet the new challenges.
- The single biggest driving force is a shortage of required skills. The traditional sources, the military and technical schools, are no longer turning out enough people to meet the demands.
- The second major driving force is the proliferation of low cost systems, with a relatively broad geographic distribution, which has changed the whole economic structure vis-a-vis field service.
 - In 1970, a \$1 million system could be supported by a resident field engineer who earned \$12,000 per year.
 - Today, a system with the same capacity costs \$100,000, and a field service technician capable of maintaining all elements of the system earns \$25,000 per year.
 - Thus, the people cost ratio for the same function has changed from 1.2% to 25% in less than ten years!
 - In addition, where once a field service technician may have had to maintain 20 systems in a metropolitan area 10 miles in diameter, today he has to cover 10 systems in a rural area of perhaps 100 miles diameter.
- The third major driving force has to do with technological advancement.

- Equipment is becoming more reliable. MTBF has improved (for electronic equipment) by at least an order-of-magnitude in the past ten years.
- More use of communications has led to the development of remote diagnostics, use of central dispatch, the ability to create fault-fix data bases, etc.
- Equipment has become modular. Diagnosis and repair can be made at the module level, rather than at the component level, tremendously simplifying the maintenance procedures.
- Designers are beginning to design for maintenance, employing devices such as built-in diagnostics, simple back-plane wiring, easy to read fault indicators, and redundant circuitry.

SERVICE PERSON OF THE FUTURE REQUIREMENTS

A. LOCAL FIELD SERVICE TECHNICIAN (LFST)

- LFSTs exist primarily to handle routine service functions such as:
 - "Cookbook" PM diagnostics and routines.
 - Repair at the module or unit replacement level.
 - Cleaning and burnishing of mechanical components.
- Skill and training requirements for LFSTs are relatively minimal:

- LFSTs do not have to be versed in theory of operations.
- LFSTs can be taught by rote.
- A high school education should be sufficient in most cases where applicants show an electro-mechanical preference.
- The appearance requirements of LFSTs will be a function of the geographic area in which they operate, the type of clientele served, and the local competition.
- Depending on function, this category will include both exempt and non-exempt employees.

B. LOCAL FIELD SERVICE SUPPORT SPECIALIST (LFSS)

- LFSSs serve as backup to the LFSTs, taking charge of problems that they cannot deal with.
- LFSSs must have a thorough grounding in the theory of operations of all systems with which they will come in contact.
 - Many positions will require the equivalent of a four-year degree.
 - Most will have to comprehend software.
- LFSSs will have to receive formal training on specific products from both hardware and software standpoints.
- Most LFSSs will have to be generalists since they will have to make decisions on non-routine problems as they come up and will have to deal across a broad spectrum of products and systems.

- LFSSs are professionals in the usual sense of the word. They need to look and act like professionals.
 - LFSSs will frequently interface with marketing/sales and may assist or actually have responsibility for the creation and sale of maintenance programs for individual customers.
- LFSSs will be exempt employees.

C. CENTRAL SITE SUPPORT SPECIALISTS (CSSS)

- Central Site Support Specialists are resident at headquarters or regional locations and are responsible for dealing with problems beyond the capabilities of field personnel.
- CSSSs are specialists in every sense of the word. They have in-depth knowledge of specific products; indeed, depending on complexity, their knowledge may be limited to an individual subset of a product. For example, the central logic unit, or the operating system software package.
- CSSSs will have a variety of backgrounds, specific to their function. Some examples of these specialties are:
 - Circuit Design.
 - Systems Software Design.
 - Test Instrumentation.
 - Mechanical Engineering.
 - Network Design.
 - Applications Programming.

- Most CSSSs will have at least the equivalent of a four-year college degree.
- In-house training will frequently include participation in the system design, development engineering, and software development teams originally responsible for a product.
- Since CSSSs will not normally interface directly with customers, appearance requirements are secondary.
- CSSSs will all be exempt employees.

ADDENDUM B: POSITION PAPER:
SERVICE AS A PRODUCT

**ADDENDUM B: POSITION PAPER:
SERVICE AS A PRODUCT**

SUMMARY

- Within the information processing industry, which includes computers, office systems, and communications, there is a growing trend toward treatment of service as a product.
- There are several underlying reasons for this shift in thinking. Three of the more important ones are:
 - Diminution of hardware costs due to technological and manufacturing advances are beginning to limit the margins that can be achieved through sale of hardware. As hardware prices will ultimately decrease faster than the market is growing, suppliers must look to new avenues for obtaining profit.
 - A growing buyer perception that service, not hardware, is the primary item that distinguishes one hardware vendor from another.
 - The cost of labor and of maintaining and distributing spares inventories are rising very rapidly. This situation tends to highlight the importance of obtaining an adequate return on investment for service functions.

HISTORICAL PERSPECTIVE AND DRIVING FORCES

- The concept of service as a product is not new. Indeed, it has been well accepted by the consumer marketplace in mature industries for a very long time.
 - Sears, Roebuck & Co., for example, has clearly demonstrated the success of the concept. Its service and spare parts divisions are among the firm's most profitable operations.
 - General Electric has established service divisions for both consumer and industrial products.
- The information processing industry has been dominated for many years by IBM (computers), Xerox (office products), and AT&T (communications). All of these firms have traditionally taken a "bundled" approach to service and, as such, had established de facto standards and umbrellas under which the rest of the industry believed it had to operate.
- Led by IBM, who is gradually separating service from hardware, the industry is beginning to wake up to the fact that the old (perceived) constraints are in the process of being removed.
- At most firms, the maintenance function has traditionally been regarded by senior management as a "necessary evil." Service usually has been included as a unit of the marketing or sales organization and, from an accounting standpoint, is treated as a cost center.
- The service function has begun to account for an increasing percentage of corporate dollars. As this fact of life is recognized by senior management, the role of the service function has changed.

- In many companies, service now has a reporting line equal to that of other functional departments, such as marketing or engineering.
- The service organization is now a P&L center in many firms.
- In the past, the typical maintenance organization was wholly devoted to testing and repair of equipment, usually on-site. Maintenance organizations are now changing their character:
 - The software support function frequently cannot be separated from the hardware maintenance function.
 - The new economics, dictated by low cost, widely distributed (geographically) systems, precludes on-site repair in many cases.
- Maintenance organizations in the information processing industry, particularly at the computer site, have been staffed by highly skilled technicians and engineers - people competent to make independent diagnoses and on-the-spot decisions. The supply of these kinds of people today has shrunk significantly, relative to the demand.
 - Service organizations have to adapt to this change by developing new methodologies to cope with the service requirements.
 - R&D costs that will be increased to develop the new methodologies will be substantial and must be recovered.
- In many sectors of contemporary American business, there is a growing recognition of the potential opportunities inherent in the service as a product concept:
 - GM's "Mr. Goodwrench" campaign has been extremely successful.

- The federal government has given increasing recognition to the concept by purchasing more and more service (as a product) from the private sector. This has spawned new companies specializing in service and has given increased recognition of the concept to established hardware vendors looking for a bigger "piece of the action."
- As computer/communications systems become more complex and more important to the everyday conduct of an institution's business, the sensitivity to "down systems" becomes greatly enhanced. Many users cannot tolerate the loss of the use of a system for any extended period. In this situation, service becomes an imperative that can be justified at nearly any price.

OPPORTUNITIES

- In 1979, service in the U.S. EDP industry alone will account for approximately \$5.5 billion of expenditures by users. Add to that the tab for office products and communications service (excluding the military) and the bill approaches nearly \$10 billion.
- Assuming a 15% AAGR, users will spend \$20 billion in 1984!
- In 1970, the annual cost of maintaining an average computer system ran about 5% of the purchase price. Today, ratios of 15% are not uncommon. This means that over an average system life of, say, seven years, users' expenditures for service will exceed the price of the hardware! If constant margins as a percent of revenue are maintained, clearly the profit opportunity for service may, in fact, exceed that from the sale of hardware.
- As equipment becomes more inherently reliable, the absolute value of the cost of service will decrease. However, it is not likely, nor necessary, that they decrease in direct proportion to the reliability of the device or system.

- As an example, consider IBM's strategy with respect to its 327X series of CRT terminals:
 - . Maintenance on the 3275 terminal sold for (on average) \$40/month.
 - . Maintenance on the new 3278 terminal is priced at (on average) \$16/month.
 - . The 3278 is at least an order of magnitude more reliable than the 3275.
- With the growing recognition (by users) of the importance of service, there is increasing acceptance of the concept of user participation in the service function. This is creating new opportunities. Suppliers are beginning to sell:
 - . Training.
 - . Instrumentation.
 - . Access to support centers.
 - . Documentation.
 - . Spare parts.
 - . Redundant equipment.

